COMMODORE user

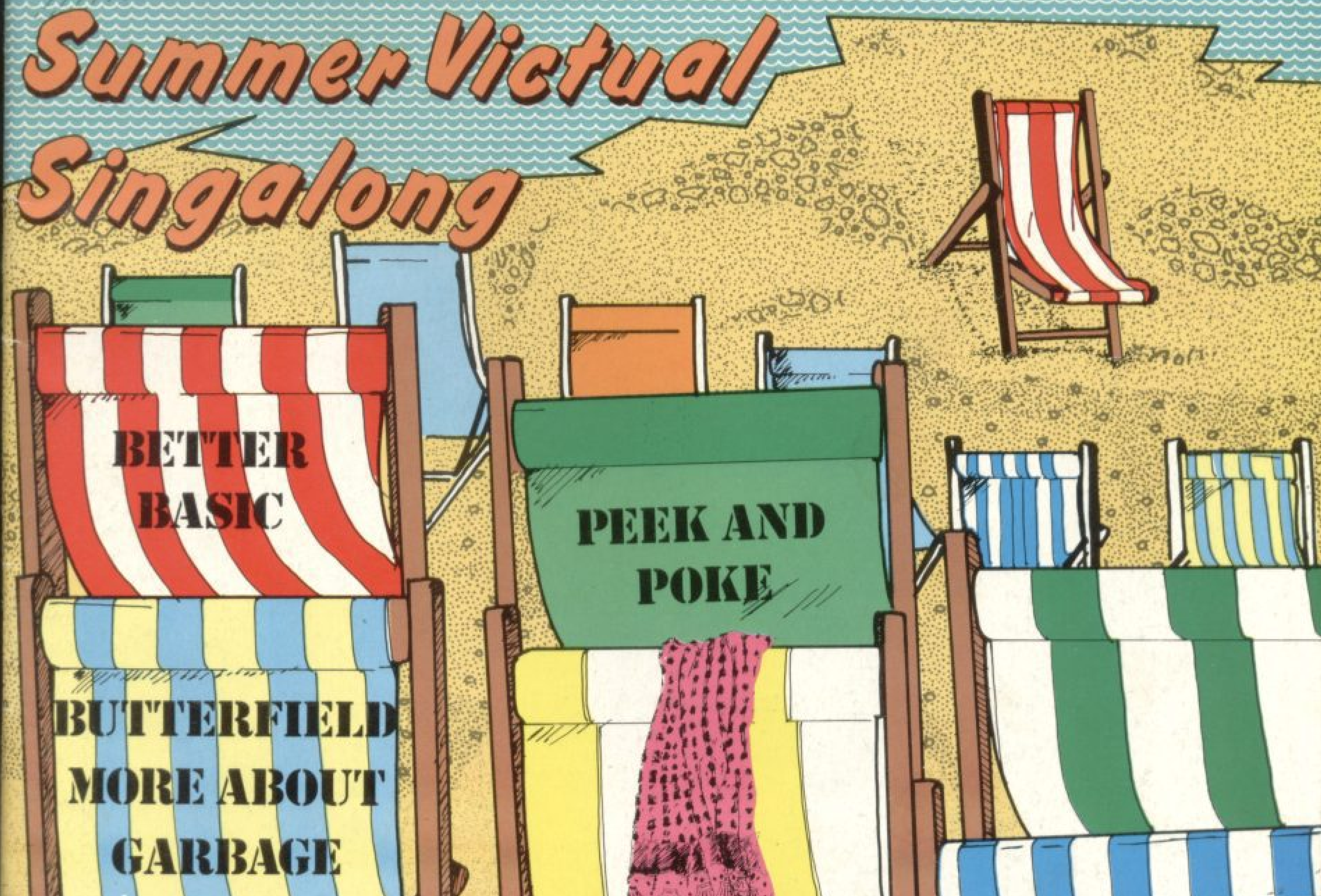
Incorporating Vic Computing

Volume 1 Issue 11 August 1984 UK Price 85p

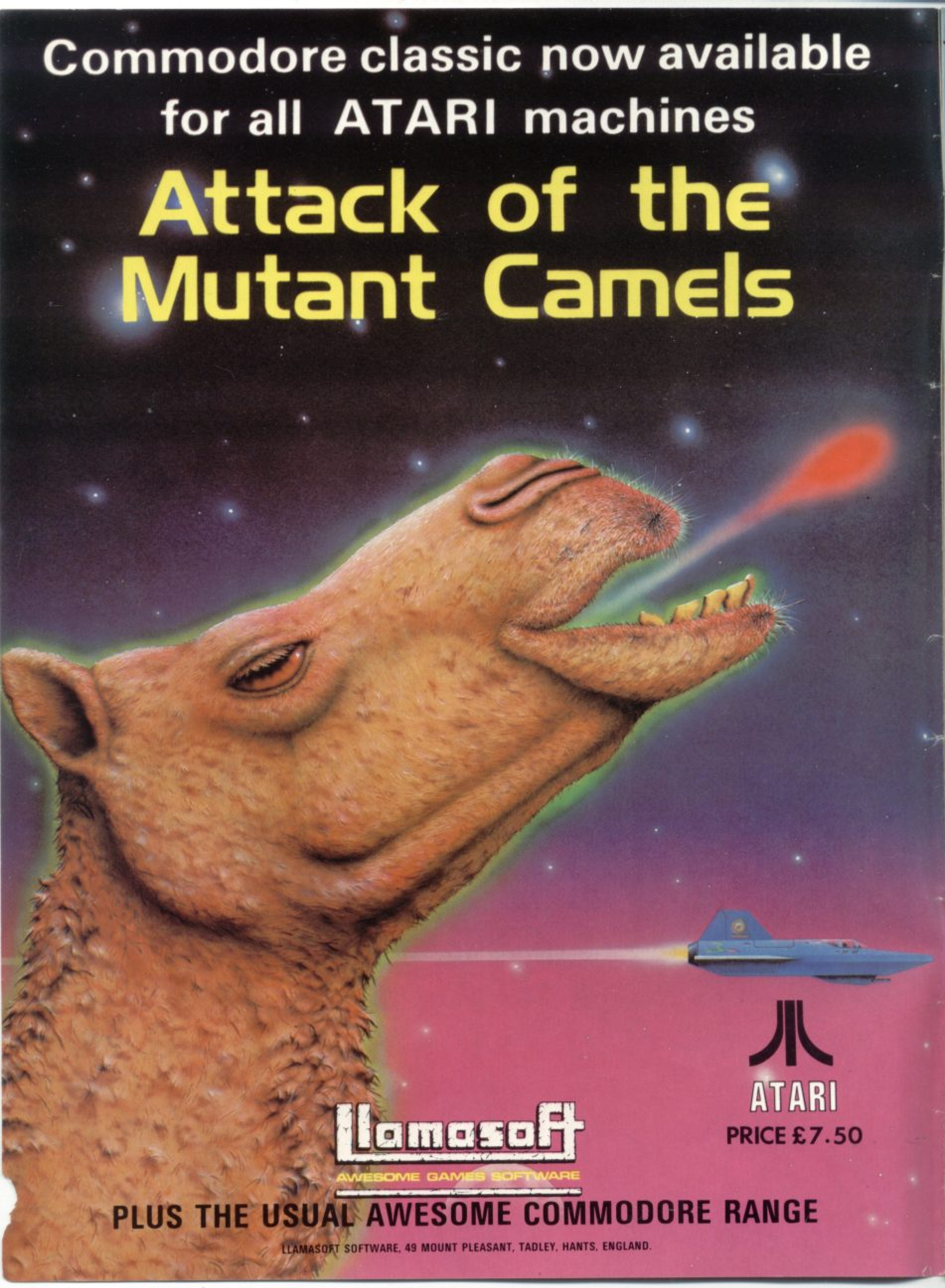
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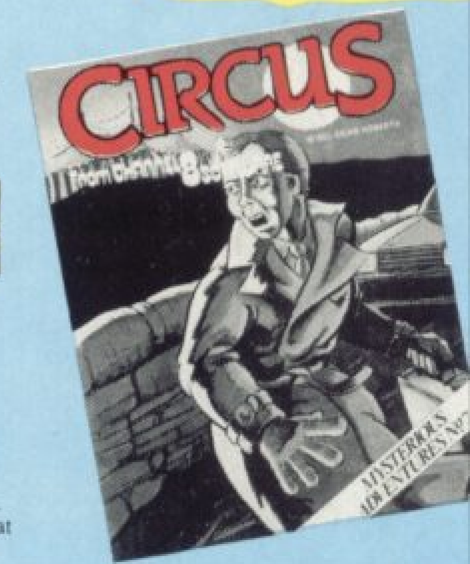

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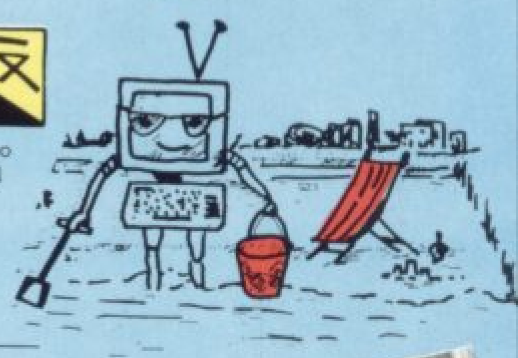
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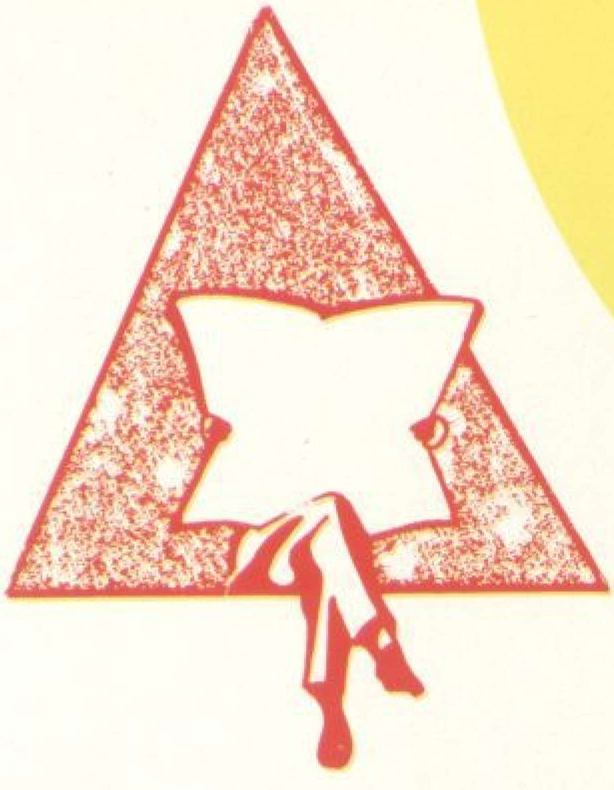
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Thorn in the side

There's an ever increasing number of banana skins littering the games software industry. What with some of the latest games tapes costing as little as a Big Mac and chips, and the enormous amount of pirating that allegedly goes on, there's a general feeling that it will all end in tears.

But Thorn EMI Computer Software is trying hard to stem that tide. Its distribution arm is now making available the complete series of Vic and Commodore 64 games from American software house Hesware (it stands for Human Engineered Software) ... and they actually cost more than the norm.

Games that cost more rather than less? The thinking behind that may be hard to swallow, but it's part of a policy which, according to Henry Kitchen, TECS' distribution marketing manager, "is to bring order to chaos" – his definition of 'chaos' being bad distribution and insufficient profit margins for dealers. "Although we were late, we've come in to do it properly", he asserts.

So TECS is using its record distribution experience to set up a nationwide dealer network and price games to suit the seller as opposed to you, the customer. You will receive telephone technical backup and help on where to find your nearest dealer. But it still leaves you paying a suggested £9.95 for a tape-based game. So you'll be expecting something pretty special for the money.

Games preview

In terms of innovation, all games have turbo loading which makes the tape load about as quickly as a disk. For the 64, the most original Hes game is *Pool Challenge* – joystick as pool cue substitute. There's an adventure game featuring ghostly manor and Count Dracula; and *Maze Master*, an incredibly complex 3D maze adventure.

For arcade fans there's *Mr TNT* – innumerable explosions; *The Pit* – tunnel your way through an alien planet; and *Rootin' Tootin'* – lots of malevolent musical instruments complete with brilliant sound.

The Vic also gets a maze game called *Shamus*, and *Pharoah's Curse* – an adventure that needs 16K expansion. Graphics are

Hesware's range also includes some educational software which is even *more* expensive at £14.95. For the 64 there's *Paint Brush* (hi-res drawing using joystick) and *The Factory* (create geometric designs on an assembly-line: just like real life, innit?). The Vic also gets five such games aimed at youngsters, which teach basic numeric, writing and keyboard skills.

The list looks pretty comprehensive. But whether you're getting value for money – and consequently whether you're going to buy them – is a different matter. American games are already available at a slightly cheaper price, and turbo loading is fast becoming the norm even on less expensive tapes ... We'll be reviewing the Hes games soon to find out.

Meanwhile, TECS plans to distribute more Hesware later this years. They will all be for the 64, have a strong educational element and, according to our sneak preview, look to feature pretty impressive graphics.

Who knows what prices will be like by then?

SHORTS

Olympics: *Those of you who prefer to take part in Olympic sports from an armchair position will be pleased to hear that Database Publications has converted its Micro Olympics game (originally on the BBC B) for the Commodore 64. "Ranges from 100 metres to the hammer throw" enthuses the blurb. Apparently, you attempt to beat the computer in all these events to set up a new world record – no medals, though. The game should be available in time for the real Olympics, and will cost £5.95.*

SHORTS

Seeing double: *Audiogenic has just announced its version of a pretty obscure arcade game called* Burnin' Rubber *– "yet another great game for the Commodore 64" – according to the blurb. Closer scrutiny reveals mention of racing through four seasons, running other cars off the road, flying over obstacles. Funny? That's exactly what* Bubble Bus's Bumping Buggies *does, a game that's been around for some time.*

So its yet another example of software houses copying the same arcade game – this time not even a popular one. The reasons are obvious. According to Audiogenic's Henry Smithson, "copies of arcade games can be incredibly big sellers. In any case, it's very difficult to be original these days". Over to Bubble Bus director, Mark Meakings, "we've now decided that everything we do in future will be completely original". Would software houses like to copy that?



Low-price monitor

Alive to the growth of the home computer market, a number of TV hardware companies have started advertising their products as "monitors", though frequently all this means is an input socket that bypasses the TV tuner.

Philips, however, is the sort of company unlikely to stoop to such hypes, and its new high-res 12in monitor is exactly what it says – and the recommended price is less than £70.

A monochrome set, with green-phosphor screen, it's obviously aimed at the word-processing and business applications markets, for whom anything less than 80-columns wide is out of the question.

But 80-columns on a TV, unless it's Sony's fine 14in set with the special computer input on the front, generally results in characters too fuzzy to be read with any ease and comfort.

The Philips set has a composite video input for video signal, or a 6-pin DIN RGB sound and vision socket.

It's easy enough to make up a special lead to go into this from the 64's 5-pin output: see page 142 of the 64 user's guide.

Computerama 64 the source

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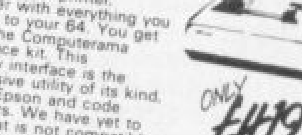
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Who shat Jayorr?

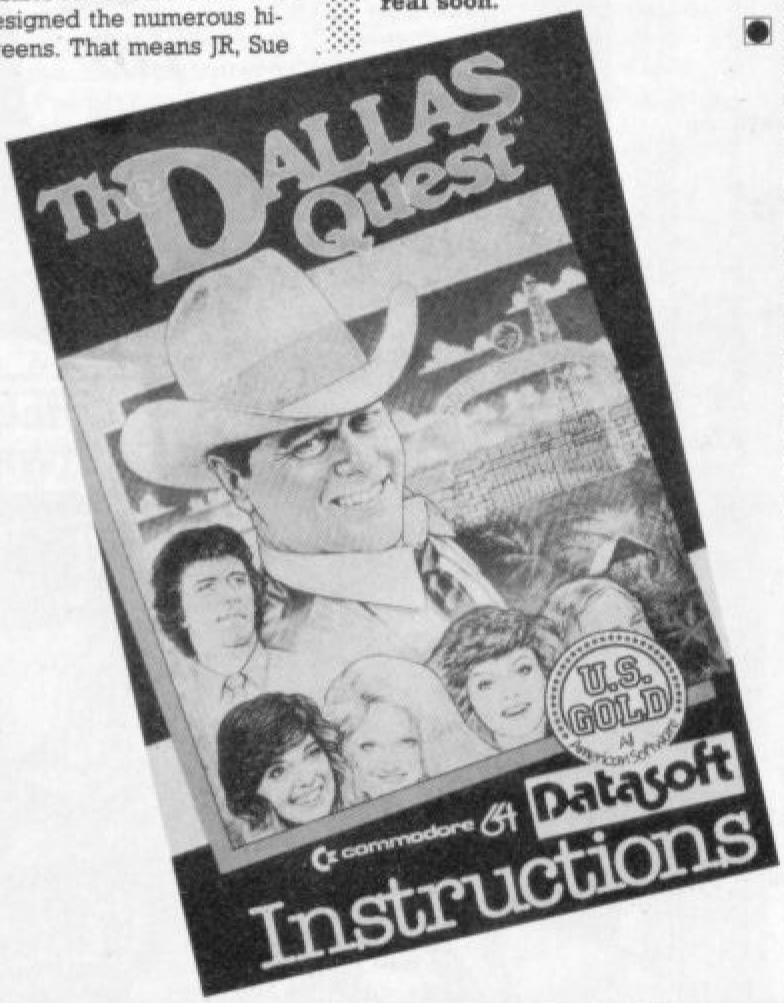
If you're missing your *Ewing* viewing and pine for those grizzly cardboard-cutout denizens of South Fork, succour is at hand. But you'll need a Commodore 64 and a disk drive.

"One of the most popular shows of all time is now playing on a computer screen near you." So goes the blurb for *The Dallas Quest*, an American adventure game for the 64 from Datasoft that's winged its way across the Atlantic – courtesy of British distributor US Gold.

The game was written by Lorimar, the company responsible for the TV series. It also designed the numerous hi-res screens. That means JR, Sue Ellen, Lucy, Ray, Krebbs and the rest of this oily clan can continue their wicked (and predictable) machinations and evil plots and cunning deceptions and ...

Here's a sneak preview of the plot. You're a super-sleuth hired by Sue Ellen to uncover a missing map that reveals the whereabouts of a South American mega-oilfield. Of course she wants the Texas tea for herself. But JR's been listening out in the hallway – "int nobadee gonna stop me gitt'n that oaal".

The game is available only on disk and costs £14.95. According to Geoff Brown of US Gold, that's a real bargain. "It costs about £28 in the States", he claims. One of our resident tycoons will be reviewing it real soon.



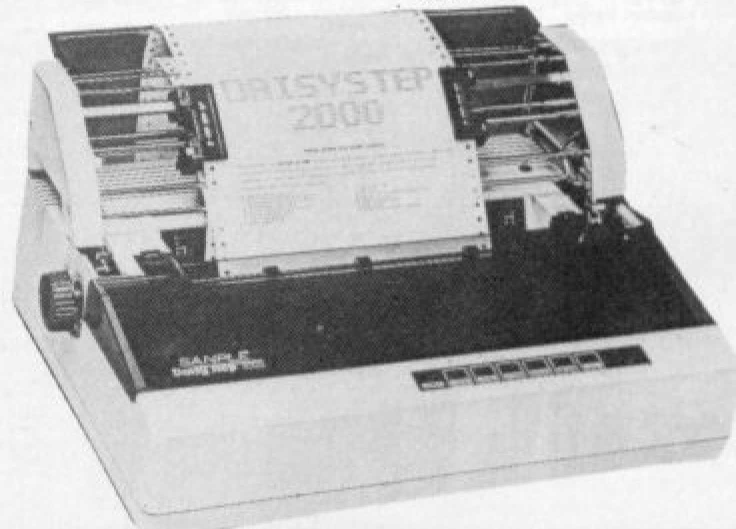


SHORTS

Daisy goes down: *We have sounded the praises of the Juki 6100 – at around £400 we considered it a real bargain-basement daisywheel printer. Enter the Daisy Step 2000, described by its blurb as "the first fully featured daisywheel under £300".*

Actually, it costs only £289 and it features a lot of facilities found on much pricier models: bi-directional printing, full Qume compatibility, super and subscripts, bold, shadow and underline, proportional spacing. Two problems – the print speed is a sluggish 16 characters per second. And a Centronics interface is supplied as standard (RS232 is optional) so you'll have to buy an interface to attach your Commodore computer.

Still, if you do need letter-quality print, at that price it's probably well worth it. More details from Keyaki on 0932 242777.



SHORTS

Not Kidding: *Eddie Kidd's greatest claim to fame is jumping over 14 double-decker buses on a motorbike. That makes him either brilliant or rather silly, depending on your point of view. But even daredevils like Eddie must take some time off from death-defying pursuits.*

So he's now helping Martech produce a game called Jump Challenge for the Commodore 64, which simulates the act of leaping over increasingly difficult and dangerous obstacles. Martech reckons it will "test the nerve and skill of every player" and is incorporating a national competition into the game, which should be available in August. Eddie Kidd probably won't be entering – he'll be too busy jumping over the English Channel.



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All American Software

Rings a Bel?



Newcomer to the bizarre home computer software business is Bel Tech, which has decided to shun the so-far lucrative games software market. "We took a management decision not to write any games", asserts John Marshall, one of Bel Tech's software developers.

According to David Lane, the company's MD: "within two years, the more sophisticated home computer software will be out-selling games". So Bel Tech is producing "sophisticated software" for the Commodore 64 *et al*, and hopes to be around if or when we can all be lured away from our joysticks.

But it gets funnier: Bel Tech is an offshoot of Bridgenorth Engineering which manufacturers water pumps for trucks and tractors. Admittedly, that company developed computer software for its production control systems.

Most interesting in Bel Tech's range is Bel Base, a cut-price and cut-down database that comes on tape for £13.65, and on disk for £15.25.

John Marshall, the man who wrote it, reckons it will be useful in the home for keeping records of, say stamp or record collections. "We haven't really identified who will use it. Being so cheap, it will probably generate a lot of uses. It's certainly what I'd want, but I don't know about other users." At least that's a refreshing piece of honesty.

Coming soon for the 64, according to Bel Tech's blurb, will be Bel Graph: "advanced function plotting, input your own equations, parametrics, bar and pie charts, line graph, input data from file or keyboard, edit, save, name records and sort". That lot will cost you £14.89 on tape or £16.45 on disk.

Then there's Bel Chem, a series of two programs for 0-level chemistry revision. Each tape will cost £8.50 (about £2 extra for the disk versions). There are plans for a similar series on maths and physics – but no programs yet.

David Lane feels "a lot of educational software is very poor and does little more than display pages of text on the screen. Our intention is to create educational programs that encourage genuine user involvement". No comments on that since we haven't seen the 64 version, yet. But the program was written by an ex-chemistry teacher.

If none of that is to your liking, you might find the Bel Gen genealogy-recording program more interesting – plot your family's descendancy from Estonian royalty? That will sell for £12.50 on tape, or £13.99 on disk. More details on 07462 5420.



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All the Fun of the Fair

by Henry Deckhand

Speculation is rife whether the promised champagne breakfast or Commodore's two new home computers were the main attraction for the mass of press who turned up early at the concrete monstrosity that is London's Novotel, venue for the Commodore Show. Certainly the Commodore 16 and Plus 4 have existed on paper (in various guises) for longer than the assembly's combined memory could stretch. Could they still be news?

Howard Stanworth, Commodore's UK general manager, opined helpfully that this was "the biggest and best show yet". Pencils scribbled it all down dutifully. He went on to grapple with the three questions that have consistently exercised our collective intellects – and yours too, no doubt. Why buy a home computer? Why buy one now? Why buy Commodore?

The answers centred on the fact that Commodore has achieved Firsts in every conceivable facet of the business at a time when computer companies are going to the wall with suicidal regularity. "We're here to stay", vouchsafed Stanworth. The press stayed to catch a glimpse of the 16 and Plus 4.

It looks as though the colour of the season is charcoal grey, a colour best suited to funeral parlours. Both the 16 and Plus 4 appeared in this sombre livery, as well as their new 1542 disk drive, 1531 Datasette and assorted printers.





Out with the old, plug in the new

The 16 is the result of throwing the Vic and 64 into a spin drier and picking out all the bits that managed to make their way to the top – sprite graphics and the SID chip apparently sank. But its enhanced Basic (75 commands) and larger memory will probably sound the death knell for the persistent Vic, despite what Commodore says ("We'll sell the Vic as long as people want to buy it"). The 16 will sell only as a starter-pack, costing £129.

Physically, the 16 looks like a Vic/64, though there are *real* cursor keys on it; but Commodore has once again thrown its famed Incompatibility Spanner into the works. The 16 and Plus 4 have a new 7501 processor, new cassette port, new joystick sockets: throw out the old, plug in the new.

At least the two machines are upwards-compatible, meaning you can run 16 software on the Plus 4 (when there is some available). They can share cartridges, too. Needless to say, 64 cartridges *won't* run on the Plus 4.

The Plus 4 does look different to its ancestors. It has a keyboard rather like the one on the SX portable and features a set of arrows (they look like compass points) rather than cursor keys. With its four built-in pieces of software (rudimentary word processing, spreadsheet, database and graphics) it will cost £249.

Both machines can use the new SFS disk drive which performs better than the sluggish 1541 but will cost around £150 more. That will probably dampen the enthusiasm the Plus 4 might have inspired in small business users.

Commodore means business

Seeing is believing; we saw the 16 and plus 4, therefore they exist. We *nearly* saw Commodore's two new and 'coming soon' business machines in what was described as a "development sneak preview". Though what we got was a cleverly disguised Hyperion 16-bit portable micro sporting a 'Commodore PC' logo.

Uncharatible claims that this might *actually* be a Hyperion were summarily quashed. "Substantial internal changes" have already been made. Moreover, the PC will feature a larger screen, a redesigned case and a desk-top version. No-one dared delve deeper.

Equal weight was given to this machine's IBM compatibility; the technical data thrown out confused us into thinking that this may be the *real* IBM PC and that the IBM PC itself is merely PC-compatible. The question of price brought us back down to earth. "We're always right up there on the pricing side", said Commodore's Gail Wellington, not the best person to pin down for an exact figure.

Then came the Z-machine (pronounced Zee-machine). This is Commodore's most ambitious project yet ... albeit clad in an old-style Pet case, since its own case lingered disconsolately at Heathrow Airport. Over to a member of the Zee-team for a technical precis. "... Z-8000 processor (pronounced Zee-8000), Coherent operating system, 16-bit data bus, 256K RAM, 1024 x 1024 screen resolution, windows and icons, i/o subsystem ..." The press was duly impressed and scribbled energetically.

Under the barrage of inevitable price-and-availability questions, Gail Wellington stood firm. Well, fairly firm: "Everything is flexible and subject to change". How true, how true. "It's too early to give a final price. But when we announce it you'll be amazed". When the announcement arrives, we may well have forgotten what that announcement was about. Enough questions; the hustle and bustle of the Show downstairs could no longer detain us.



So you didn't manage to get down to London for Commodore's recent Fifth International Computer Show extravaganza? You didn't shove along with the crowds, get plastered with stickers, play a few games, find out what's new? Henry Deckhand did just that and survived to file this special report.

Upstairs, downstairs

Sensibly, the Show was split into two sections: business upstairs, zapping and other recreational activities downstairs. This organisational feat meant that the cacophony of computer-generated noise did not impinge on more serious pursuits. It meant that upstairs was somewhat less than crowded. And it also meant that the labyrinthine passage between the two halls became the most crowded of all.

Radio Luxembourg vied with the software houses downstairs to see who could produce the most sound; but scored maximum points for manic idiocy of presentation (there was no real competition). It produced a few body poppers, some rent-a-smile 'Commodore lovelies' and guest celebrities. Those included Stirling Moss, the sartorial Patrick Moore, George Best (who broke a Commodore joystick playing *International Soccer*) and a TV-AM personality nobody recognised.

Commodore User produced its own celebrity, Peter Bartley, winner of our mammoth £1,000 competition of software and add-ons from Pilot Software City. Peter (more than six feet tall) received his stack of goodies and a few words from DJ Dave Eastwood (almost less than five feet tall): Eastwood spent a great deal of time standing on a chair.

Across from RL's stand, a Cult Figure was to be seen in the shape of the bearded and approachable Jeff Minter. Rumours abound that he never left the **Llamasoft** stand, content to chat idly with a throng of awestruck youth. Apart from *Sheep in Space*, Jeff's latest offering is a conversion of *Metagalactic Llamas* for the 64; "the result is a very nice blast ..."

Apart from its new *Le Mans* driving game (hence the presence of Sterling Moss)

Commodore had a pre-release version of *Basketball*, written by Andrew Spencer of *International Soccer* fame. It will be released on cartridge, will cost £9.99 and looks to be up to Andrew's excellent standards. Certainly it uses lots of the stylistic tricks from *Soccer*...

Bubble Bus showed two new games on a stand cunningly disguised as a bus. The disguise was near-perfect, since the bus was parked motionless in the middle of the road. *Flying Feathers*, an eagle shooting game, has already received complaints from a bird protection society. So far, nothing has been heard from the AA about the other newish title, *Bumping Buggies*. Both cost £6.99.

Equally eccentric was **Audiogenic**'s disk-based *Alice in Videoland* for the 64, costing £12.95 – announced about a dozen times since it appeared at the last Commodore Show. It has four scenes, all of which display quite stunning graphics. Most of Lewis Carroll's nutty characters are present (including the Jabberwock, galumphing along in hi-res mode).

Outsider's view
by Chris Durham

Regular contributor Chris Durham spent a couple of days at the Show. Here are his reflections...

The fifth Commodore Show was once again a mixture of sights, sounds, heat and people; amongst it all the goodies that everyone had come to see. Some of it was excellent, some of it was less than breathtaking. But overall I think we got a sense of progress, of moving forward to new areas and new limits for owners of Commodore computers. Just what you want from a show like this, in fact.

The first thing that sticks in my mind is the great improvement in games graphics over last year; there were many more games for the 64 this year, and visually they were vastly superior to many of those previously available.

Another area which has grown since last year is the field of 'do-it-yourself' graphics packages. In spite of the lack of Basic commands, the 64 has quite reasonable graphics facilities; judging by some of the entries for the 'Graphic Art' competition and the demonstration pictures for the Koala graphics pad, these are now being taken to their limits.

Likewise the musical side of the 64; at least two excellent sound systems were on display, Musicalc and the Midi synthesiser interface, plus a number of cheaper synthesiser programs for those whose musical ambitions are rather more limited.

The big disappointment of the show was, paradoxically, Commodore. After all the hype over the new machines I was expecting something rather more up-market; in fact at first glance I thought the Plus 4 was the cheap games machine!

I also fail to see why Commodore brings items to display, places them three feet inside a barrier so you can't see them properly, and then neglects to provide any information about the products. I asked for information on both Magic Voice and the new modem; but no fact sheets were available, and the people on the stands were unsure about any of the important details.

Overall, though, the Show was good value; it gave Commodore owners the chance to see what was available for their machines and to check out some of the new products lined up for the future. I would take bets that attendance was down on last year, though; Certainly some of the exhibitors reported takings well down on last year's figures. Perhaps people are being a little more selective about what they spend their money on these days: but whether they spent money at the show or not I suspect you will find few who regretted going.

Commodore conversions

On the games front, **Stack** added to its already extensive list of goodies by showing a first version of what looks like a damn near unbreakable joystick – something of a Quickshot copy and built in unlovely plastic, but it has a nylon ball at the base of the stick which we just couldn't snap off in three days of Frenzied Flight simulation. Should retail for about £8, which is pretty good.

New to the Commodore scene is **Micro Power** which launched four games for the 64 – *Ghouls, Cybertron Mission, Felix in the Factory* and *Swoop* – all of which have been converted from the BBC and Electron micros. They retail at £6.95 each. More examples of the conversion syndrome came from **Quicksilva**, newly acquired by the British Electric Traction Company (purveyors of a magazine called *Computing Today*). Quicksilva announced *Trashman, Escape* and *3D Tunnel* for the 64, newly transferred from the Spectrum.

Not to be left out, **Mirrorsoft** has made its *First Steps With the Mr Men* programs available on the 64 (will we ever get Ms Women versions?). It also had a few new items to offer, notably the *Go-Sprite* sprite editor for the 64 – that offers goodies like expansion contraction and inversion, up to seven layers of overlay, multi-colours and simple animation of up to 32 sprites: £9.95 on tape and £11.95 on disk.

Anirog showed an interesting three-in-one utilities package for the 64; *Gas-Kit* costs £14.95, adds 23 extra commands to Basic for graphics, animation and sound capabilities. Not to be outdone, **Bubble Bus** had the *Quadrillion* package of four utilities for the same price: word processor, label and poster printer, and Advertiser, which turns your 64 screen into a moving message display – handy for telling Johnny his dinner's in the oven.

For those with an artistic disposition, the 64 has spawned a couple of impressive drawing and graphics packages. One is the American-derived and much-heralded *Koala Pad*,

distributed in the UK by **Audiogenic**. It uses neither lightpen nor joystick but a touch-sensitive pressure pad which makes it as easy as drawing on paper. It's not very big, though: a notepad rather than a poster wall.

There's a range of eight 'brushes', the first one giving single-pixel definition. All the usual drawing functions are included plus facilities to move objects around, create mirror images, zoom, move objects to different pictures and save pictures on to disk. Obviously, that lot makes it rather expensive – £89.95 for cartridge, £79.95 for disk software. We're reviewing it and will report.

Also from America comes the *Super Sketch* graphics tablet from a new Texan Company called **Personal Peripherals Inc**. This uses a stylus attached to a moving arm – the tablet's surface is not touch-sensitive. Like Koala Pad, its software is cartridge-based and will allow all the usual drawing facilities. But four more cartridges will be available for graphics, writing musical notation, interior design and presenting business charts and diagrams like a slideshow.

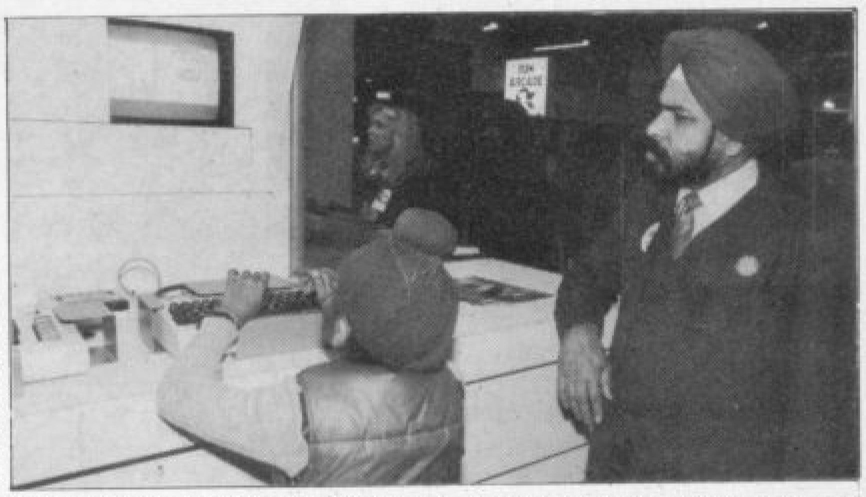
According to Tom Hyltin, PPI's vice-president of engineering, "weer in the process of saanin a major Bridish distribooder". When that happens, Super Sketch should be available at around £59 – together with PPI's Super Stik, a smooth-operating joystick at around £9.

Moving up to business

Vying with Commodore's two upstairs stands (which looked ominously like missile silos) was **Precision Software** whose success with *Superbase* allowed it to grab a considerable chunk of floorspace.

Precision is trying to make Superbase even more unassailable as *the* database by introducing a clever range of products which run under it. *Stepping Stones* is a range of ten sample applications, costing £10 each, with data entry and file layouts already defined – for first-time users or people who can't be bothered to set their own parameters.

But to get across the idea that Superbase can be used at home (even more sales), there's the *Homebase* range which also runs under Superbase. Using one of these, you can store information about your favourite football or cricket team, file all your books and records, birthdays, names and addresses and even work out how many Gold Tops you've ordered from the milkman. With that lot, you'll be lucky not to trip



over all the databases you've created. The four Homebase packages cost £17.95 each.

Somewhat more practical is *64 Doctor*, a new diagnostic program for the 64 from **Practicorp**, at £17.95 on tape and £19.95 on disk. If you've shattered your nerves trying to find out what's gone wrong with your system, this could be for you: 64 Doctor checks out just about every facet of a complete system.

Also new from Practicorp is the *PS* programmable spreadsheet, an extension to its established and well-liked *Practicalc*. PS lets you write subroutines in Basic or machine code for advanced calculations and complicated manipulation of data.

To *really* confuse you, though, **Saxon Computing** displayed *Figaro 64*; which it described as "not a spreadsheet and not a database". Figaro is designed for storing a lot of numeric data and organising it in a form from which meaningful and colourful graphics can be generated, using Figaro's own graphics facility. It can also present those graphs sequentially, in the form of a slideshow. Figaro 64 costs £65.

One of the technically most impressive bits of software we've seen for the 64 was on the **Supersoft** stand, a French package called *Master* which has been around for a while in Pet versions.

This is a serious programmer's maxi-toolkit – it gives you a complete Basic 4.0, all the usual toolkit facilities, and a machine code monitor. But it also provides extensive screen and printer handling, a genuine ISAM file system (up to 10 indexed files at once, with keyed access and data compression) and an extended Basic...

On the Technical Excellence front, a word for those clever blokes at **RAM Electronics**. Latest 64 goodies include a £35 *speech synthesiser*, a cartridge *speed-up for the 1541* at £50 (save and load three to four times faster than normal), and – wait for this – a *512KB* memory expansion for the 64. That wasn't on show, but it's promised for later this year. Don't ask me how they do it..

Accounts and maintenance

On the accounting front, **Anagram** is pretty well established now with its apparently bug-free and elegantly written accounts packages for the 64 and other Commodore machines. It also has a new product, *Cash Book 64*, selling at £75. At that price, it should interest the self-employed or small businessman considering computerised accounting.

Breather from business

Most of the stands upstairs were devoted to business. One notable exception was our own **Commodore User** stand which was demonstrating *Musicalc* – new, American and very impressive (that's why we rushed to get hold of it). It's a music package for the 64, on show for the first time in this country, that provides *real* music synthesis – the kind of thing you might pay a grand or two for from a professional synthesiser.

The Musicalc series consists of three packages: Musicalc 1, the synthesiser and sequencer (which forms the basis of the system); Musicalc 2, a score writer; and Musicalc 3, the keyboard maker. On top of that, there's a series of rythm and backing templates, all of which turn the 64 into a fully fledged synthesiser. No prices are fixed yet since we haven't signed the deal; but at the Show we had Musicalc 1 at £45, £31 each for Musicalcs 2 and 3.

Musicalc extends the horizons of your 64. So does the *Compunet* network, jointly developed by **Commodore** and **ADP Network Services**, which was being demonstrated just across the way – another one that appeared in embryo form at the 1983 Show and then disappeared for a year.

Once you've bought your 64 modem (it costs £99.99 but includes a one-year subscription to Compunet), you can do three things with it.

First, you can buy Vicsoft and other programs – which are then downloaded directly to your 64 over the phone. But how do you pay for the goods? Easy. When you register with Compunet, you give it authority to directly debit your bank account.

That goes for the second facility too – Comp-U-Card, the computer shopping facility. You can order anything from a Hoover to a heated trolley "at discount prices" from the comfort of your armchair. And that's a good reason for keeping your 64 locked away.

The third facility is information services and electronic mail, which includes basic functions as well as a facility called the Jungle, a billboard for buyers and sellers. You pay the cost of the call and a small charge for storing your message or advert on the central database.

For the ardent programmer who's cracked both Basic and machine-code, **Oxford Computer Systems** had its new and mightily impressive *Pascal compiler* for the 64. The compiler costs £14.95 on tape and £49.95 on disk: both feature extra graphics and sound commands.

Why the huge price difference? Mainly because the cassette version has a resident compiler; the program is loaded once and sits there, taking up a large chunk of memory (about 16K). Since a disk can be accessed randomly, it doesn't need to store such a great chunk in memory, giving you the 64's own memory limit as the maximum source file size.

Oxford also displayed its great new driving game for the 64, *Turbo 64*. Being upstairs, it didn't get the attention it deserved.

Overview

Although the Show gave Commodore chance to launch its two new micros, it took a keen eye to spot the disappointing number of new and innovative products – most of the software and peripherals we'd seen or heard about already.

For those of you in Northern climes who were looking forward to a re-run of the Show in Leeds this September, the news is bleak: Commodore has cancelled it. For what reason? Officially, Commodore says the Show will clash with the company's move to it's new Corby HQ...

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ALL OFFERS SUBJECT TO AVAILABILITY

Garbage Collection on Commodore Computers

Part 2

by Jim Butterfield

We have looked into some of the causes of garbage collection delays, and have investigated some of its working mechanisms. It's time to put our knowledge to work. First, let's develop some rules.

The following program will help us see the rules by means of examples:

```
100 DIM A$(800)
110 FOR J=1 to 800
120 A$(J)="A"
130 NEXT J
140 PRINT "X"
150 PRINT FRE(0)
160 PRINT "Y"
```

The Rules of Garbage Collection

Rule 1: There are *static* (in place) strings and *dynamic* (created) strings. Only dynamic strings have garbage collection consequences.
Proof: Run the above program (which contains only static strings). There will be no significant delay between the printing of X and Y. Now change line 120 to read ...

```
120  A$(J)=CHR$(65)
```

Run once again; there will be a significant pause between the printing of X and Y.

Rule 2: Garbage collection time depends on the number of dynamic strings you *keep*, not what you throw away.
Proof: Change line 120 to read ...

```
120  A$(J)=CHR$(65):A$(J)="A"
```

Run the program. Even though we're throwing away a large amount of garbage (the first A$(J)=. .0), there's no significant delay.

Rule 3: Performing a garbage collection saves you no time on the next one.
Proof: Enter line 120 as ...

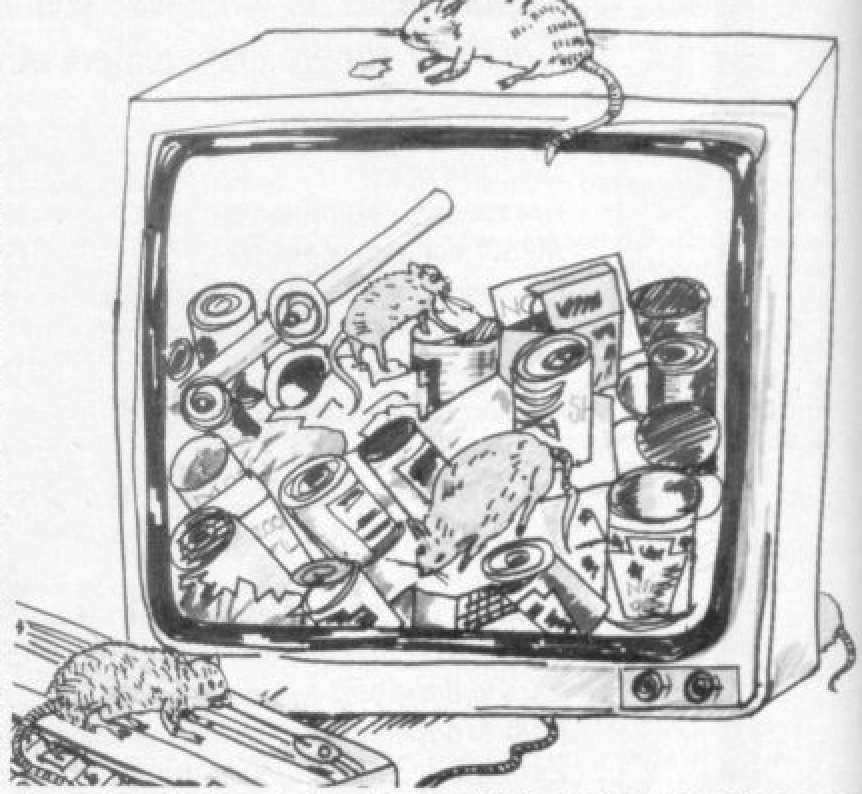
```
120 A$(J)=CHR$(65)
```

Run and note the delay. Now type **GOTO 140.** Note the delay is exactly the same as before; the previous collection saved us no time.

Rule 4: Doubling the number of strings will multiply the delay by 4. Mathematically, we can say that the time varies as the square of the number of strings.
Proof: Change the value of 800 in lines 100 and 110 to 400. Run and note that the delay between the printing of X and Y drops to one quarter of the previous time.

This last rule is the killer. You might work out a test program using ten strings, and when your program works satisfactorily expand to one thousand items. But your garbage collection time doesn't increase by a factor of 100 ... it jumps to 10,000 times the original delay. This could become crippling.

If you know what to look for, you can usually avoid massive garbage collection delays. There's no single technique that will do the job. It's best to investigate what's causing the garbage and decide on the appropriate action to eliminate the problem.



Here's a list of techniques to get around the garbage collection hangup.

One: Don't move strings around

Suppose we are writing a program to input several names and sort them into alphabetical order. It would seem logical to move the names so as to put them into the right place.

Don't. Use an index array, which contains only numbers: move the index values, not the strings. A simple example:

```
100  PRINT "INPUT TEN NAMES"
110  DIM N$(10),I%(10)
120  FOR J = 1 TO 10
130  PRINT "NAME";J;
140  INPUT N$(J)
150  I%(J)=J
160  NEXT J
170  PRINT "SORTING..."
180  FOR J=9 TO 1 STEP -1
190  FOR K=1 TO J
200  IF N$(I%(K)) (<N$(I%(K+1)) GOTO 220
210  I=I%(K):I%(K)=I%(K+1):I%(K+ 1)=1
220  NEXT K,J
230  FOR J=1 TO 10
240  PRINT N$(I%(J))
250  NEXT J
```

The above program uses a bubble sort technique, which is notoriously inefficient; but the point here is that the strings N$(. .)

are never moved. Thus, there can be no garbage collection. Note that the index array must be initialized before use – see line 150.

Two: Clean up between blocks

Suppose you're reading in a large file of students from various courses. For a number of reasons – especially processing convenience and shortage of memory – you don't read in *all* the students. Instead, you read and process a class at a time.

Before reading in the next class, set all student names, etc. to null strings. Now, force a garbage collection with a statement such as Z=FRE(0). There will be few or no strings to keep, so garbage collection will be fast. When the next block of data – the next class – comes in, it will have freshly cleaned memory to use.

Three: Do local cleanups

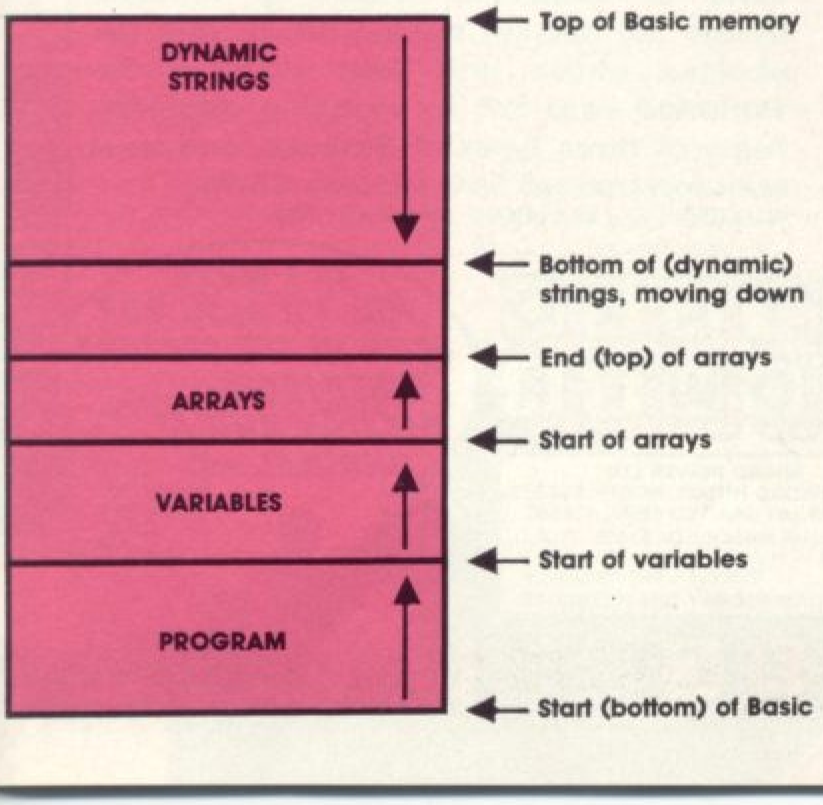
Many programs like to build strings from GET statements. The code often looks like this:

```
500 PRINT "TYPE IN YOUR NAME"
530 N=" "
540 GET K$:IF K$=" " GOTO 540
550 IF K$=CHR$(13) GOTO 600
560 N$=N$+K$
570 GOTO 540
600 ...
```

This sort of thing creates a lot of garbage. Every time line 550 is executed, a new N$ is created and the old one is thrown away; and N$ gets bigger and bigger all the time. There's also garbage from K$, but it's only a single character at a time.

If N$ and K$ were our only strings, we'd have no problem. Garbage collection time depends only on what you keep, not what you throw away; and keeping two strings isn't much work. But if this were part of a program which also had a thousand names and addresses we'd be in trouble; everything would need to be reclaimed, and the delays would become impractically long.

If we're careful, we can get around this problem by setting the stage for a 'local' collection. We might reason as follows: during the above code, N$ and K$ are our only working strings. If we make all the other strings disappear momentarily, we may generate all the garbage we like, since garbage collections will be virtually instantaneous. When we're finished, we must carefully force one last collection to get rid of any leftover garbage, and then make the missing strings reappear.



We can do this *temporarily* moving the top-of-Basic pointer down to match the dynamic string pointer. This will fool the garbage collection routine into thinking that there are no dynamic strings except the ones we have just created. But we must remember to put the top-of-Basic pointer back when the job is finished, or we'll suffer permanent loss of memory.

The top-of-Basic pointer may be found on the Vic and 64 at addresses 55 and 56. We must save the values there so that we can replace them later, and then use the contents of the string pointer (51 and 52) to change the top-of-Basic pointer. (In the Pet/CBM, the top-of-Basic pointer is at 52 and 53, and the string pointer is at 48 and 49; we'll show coding for the Vic/64 below but you can adjust it for your machine.)

Here's how we would change the above coding to eliminate garbage collection dangers:

```
500 PRINT "TYPE IN YOUR NAME"
510 A1=PEEK(55):A2=PEEK(56)
520 POKE 55,PEEK(51):POKE 56, PEEK(52)
530 N=" "
540 GET K$:IF K$=" " GOTO 540
550 IF K$=CHR$(13) GOTO 580
560 N$=N$+K$
570 GOTO 540
580 Z=FRE(0)
590 POKE 55,A1:POKE 56,A2
600 ...
```

It seems complex, and you must indeed code with great care. But it solves the problem.

Four: Use numeric values

Who says that everything that seems alphabetic must be a string? A month can be coded 1 to 12; a grade of A to F can be a numeric from 1 to 6.

Where the number of possible strings is limited – a class, a region, an airline – using a numeric system is quite feasible. You can always look up the string you want by using the number as an index and getting the name out of an array.

I wouldn't recommend that we all lose our names and become numbers within the computer. But a little sensible data reduction can save a lot of garbage collection.

Five: Brute force

Sometimes conventional methods fail. Like your data consists of a large number of names which have been read in from a file: you need to make changes to a substantial number of these names. There seems to be no way you can control the amount of garbage. What then?

When all else fails, write out all your strings to disk. Set the strings to null values and force a garbage collection – this will take place instantaneously. Now read them back in to the newly cleaned up memory.

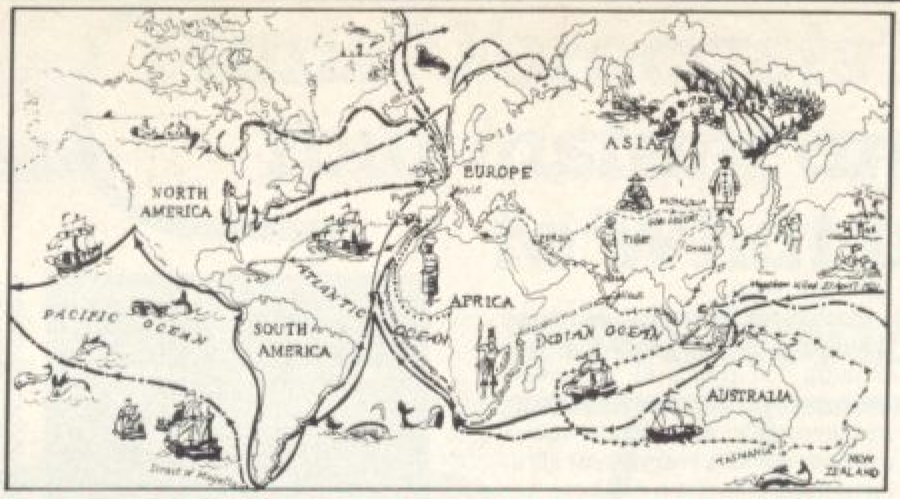
You can watch the string pointer (addresses 51 and 52 on the Vic/64), and when it seems to be getting near the danger point, initiate this whole operation. At least it will be under your control; you can print a message to the user (TAKE A BREAK WHILE I UNSCRAMBLE MY BRAINS), and may even get the bonus benefit of having generated a data backup or 'checkpoint' in case of loss of power.

And it's a lot better than having the machine go dead for twenty minutes ... or more.



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Adventure Games



The Commodore 64 is a particularly good machine for adventure games because of its large memory. So it's not surprising that a large range of games are now available to suit all adventuring tastes. Here's a sample of offerings for the 64 – and one for the Vic. Coming soon, an occasional column of tips and playing hints for the adventurer.

ADVENTURE QUEST

Commodore 64
Keyboard only
Price £9.90

Adventure Quest is one of a truly outstanding *Middle Earth* trilogy from Level 9 Computing, featuring a neat scrolling text with no memory wasted on unnecessary pictures. By using a super-compact language and text compressor, this program has well over 200 individually-described locations loaded with innumerable objects and characters. Result? A brilliantly constructed Adventure.

The comprehensive instruction booklet provided with the tape reveals that Orc armies have unleashed a savage onslaught upon Middle Earth. The last chance for survival rests with the faint hope of your finding the Black Tower, source of the enemy's demonic power, and destroying it. Entry can only be effected however by possessing the four Stones-of-the-Elements, which are scattered throughout an awesome landscape.

With Death a constant companion (isn't he always?) your search takes you through thick forests, across scorching deserts, and high up into the mountains. Deep within these lies a frightening complex of tunnels, pits and caverns, leading to yet more intriguing locations – and finally to the Black Tower itself.

The problems to overcome are many and difficult – most of them intricately linked. As the enclosed booklet states, "Almost everything in Adventure Quest has a purpose: if only to keep you trying to work out its purpose". Once you start this Quest there's no turning back ... *LP*

Level 9 Software

Presentation:	■■■■■
Skill level:	■■■■■
Interest:	■■■■■
Value for money:	■■■■■

SCREEN SCENE

FEASIBILITY EXPERIMENT

Commodore 64
Keyboard only
Price £9.95

You are subject to a 'feasibility experiment', alone on an artificial world constructed by a dying alien race. Your mission is to collect a number of treasures scattered throughout a representation of Earth's history.

On the way you must overcome such obstacles as Roman guards, gladiators, lions, dragons, and even the perils of an abandoned coal mine (*the best games are always topical – Ed*). It is these heroic actions that provide the essential life force from which the disembodied aliens must feed to survive.

Feasibility Experiment follows the usual *Mysterious Adventures* practice of a split-screen display with both text and graphics.

I thoroughly enjoyed the experience; but if it happens that your progress does grind to a frustrating halt, Channel 8 can provide a Clue Sheet for this and all the other Adventures currently available from them. *LP*

Channel 8

Presentation:	■■■□□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■■□

CIRCUS

Commodore 64
Keyboard only
Price £9.95

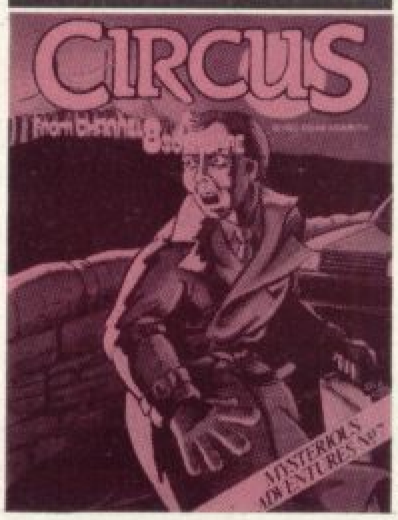
Out of petrol, miles from anywhere, you stumble across the darkening landscape in search of human habitation and, perhaps, assistance. You hear a faint noise and are drawn on until, in the distance, you recognise the blazing lights and buoyant roar of a seemingly harmless circus.

As you race toward the main gate a sudden deathly silence descends and blackness envelops the site. You are about to enter the mystery of a ghostly Big Top and its apparently doomed inhabitants ...

Although I found this not too difficult, *Circus* is an original and interesting conception, the mystery of which is revealed as you progress. This must be resolved: and finally you must escape with your life. That is, if you haven't already made a fatal mess on the canvas wall – or the sawdust ring for that matter! Certainly a refreshing change from my usual haunts of disgusting dungeons and endless dark tunnels. *LP*

Channel 8

Presentation:	■■■□□
Skill level:	■■■□□
Interest:	■■■■□
Value for money:	■■■■□



MISSION IMPOSSIBLE

Vic-20 (unexpanded)
Keyboard only
Price £9.99

Or *Secret Mission* as it is now named, because of objections to its original title by the TV series. This Scott Adams Adventure cartridge is text only; it opens with you alone in a Briefing Room with only a tape-recorder for company. Playing the tape reveals that your mission, "Should you decide to accept", is to prevent the detonation of a large time-bomb concealed in the depths of a nuclear power station.

As you're stuck inside said power station anyway, you have little choice but to accept this task and locate the device. I soon realised that to penetrate all sectors of the power station I would require the relevant Security Passes. Getting this together initially took some time – too much time, in fact. More than once my surgically-implanted bomb detector indicated "Condition Red – Final Countdown Begun".

Although rather limited in locations and objects, this Adventure certainly had me puzzled in places. Keying in 'Score' to find out how I was doing, I was greeted with "In this adventure, there's NO score. Either you make it or ..." Well, I did make it eventually – in two intense hours. That was the only disappointing facet to this very playable Adventure. It was my first stab at a Scott Adams product; and having read so much about The Man and his work, I was expecting a longer stay at the keyboard. Difficulty rating – moderate, but recommended for beginners! *LP*

Commodore

Presentation:	■■■□□
Skill level:	■■□□□
Interest:	■■■■□
Value for money:	■■■□□

PERSEUS & ANDROMEDA
Commodore 64
Keyboard only
Price £9.95

This Adventure places you in the turbulent times of Ancient Greece. You are Perseus, commanded by King Polydectes to search out and decapitate Medusa the fearsome Gorgon, then to rescue the fair maiden Andromeda.

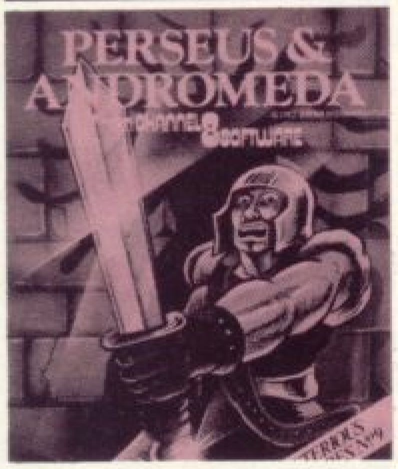
Never one to disagree with a King, you wander about what seems at first a rather limited setting. Eventually however your horizons broaden; and with care you won't be crossing the river Styx too often!

There is some assistance to be had from the Gods as you flit from one location to the next, encountering some of the creatures to be found in Greek mythology – most of them hostile. "The Gods will cut out your tongue!" threatens one of them.

As with all the *Mysterious Adventures* from Channel 8, the top half of the screen can give either a brief description of your location, or a reasonably well-drawn picture. The bottom half handles the questions and answers. The two-word input, however, can sometimes leave you with the frustrating search for the exact vocabulary.

Channel 8 *LP*

Presentation:	■■■□□
Skill level:	■■■□□
Interest:	■■■■□
Value for money:	■■■■□



TRANSYLVANIAN TOWER
Commodore 64
Keyboard only
Price £6.50

This 'Graphic Adventure' is set in the five floors of Count Kreepie's castle, each floor represented by a different maze.

At the start you are placed in the dungeons; you must find your way through 100 rooms to locate the main exit, using the arrow keys for movement. On each move, you're presented with a (very plain) 3D illustration of the room you have just entered and the exits open to you.

Once the main exit has been found, there is a 30-second wait for the next maze to be generated. From here on you will encounter the vampire bats which can be killed by a variety of weapons. The bats and weapons are randomly scattered throughout the myriad of rooms, and only by killing a required number of bats are you allowed to exit to the next floor. Killing a bat also gains you a brief look at the map and your position thereon. Ultimately you must reach the fifth floor, kill the Count, and steal his treasure.

LP

Richard Shepherd Software

Presentation:	■■□□□
Skill level:	■■■□□
Interest:	■■□□□
Value for money:	■■■□□

THE TIME MACHINE
Commodore 64
Keyboard only
Price £9.95

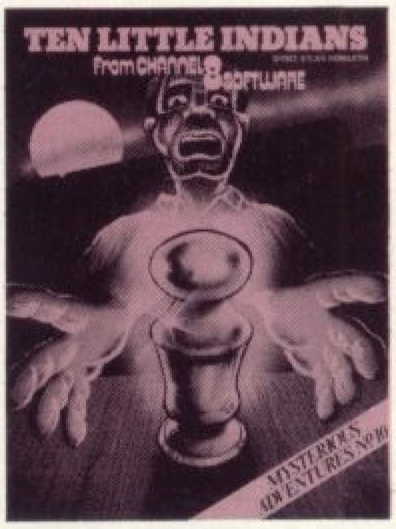
Search for a kidnapped Professor using his temperamental time machine. You must first locate this contraption, and then use it to travel through time in a somewhat haphazard fashion to uncover three glass prisms each hidden in a different era of Earth's history. Locations include the brig of a deserted sailing ship and the treacherous sands of Egypt.

Once in possession of all three prisms you can control the time machine.

I found this the easiest of the *Mysterious Adventures* series – which by no means detracts from it, but the competent Adventurer should complete this in an evening or two. The presentation is the customary split-screen, the top half displaying the graphics and location description, the bottom for questions and instructions. *LP*

Channel 8

Presentation:	■■■□□
Skill level:	■■■□□
Interest:	■■□□□
Value for money:	■■■□□



TEN LITTLE INDIANS
Commodore 64
Keyboard only
Price £9.95

One of the 'Mysterious Adventures' series from Channel 8, *Ten Little Indians* is an intriguing investigation into the whereabouts of a valuable gold figurine – the precise location of which is only revealed when ten other worthless figurines have been brought together.

The Adventure begins innocuously enough – you find yourself standing alone in a railway carriage, proceeding to the mansion of the late Major Johnston-Smythe where you believe the gold is to be found. When you eventually manage to disembark and head for the mansion, you are given several opportunities to become a deceased person – which I did, frequently!

Locations range from the railway station and a riverside wharf to the mansion itself. Several figurines present themselves rather easily, but some are fiendishly difficult to find. Indeed, a few of the problems posed in this Adventure were quite baffling.

The format is the familiar Adventure split-screen. The top half can alternate between a written location description and a fairly attractive picture of it, the bottom accomodates the question-and-answer text. There is the usual restrictive two-word input; but no matter, this is an enjoyable detective romp for the novice and experienced alike. *LP*

Channel 8

Presentation:	■■■□□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■■□

THE SORCERER'S APPRENTICE
Commodore 64
Joystick and Keyboard
Price £9.95

This package contains two tapes, labelled 'Action' and 'Adventure'. In the Action game you control a little cloaked figure chasing about the screen trying to prevent a broom from dropping its buckets of water into your walled dam (which runs up the right side of the screen).

Nudging the broom with your little man causes the buckets to disappear and the broom to seek more water from a well. Occasionally brushes will scoot across to steal bricks from the dam, reducing its height. These also can be repelled at a nudge.

If the dam eventually overflows you lose one of your three lives. Surviving the time limit, however, reveals the password necessary to enter the Adventure. Clues to help you are displayed after each of three subsequent levels; each level has an identical screen display as the first but provides more brooms to contend with. Within each level the brooms do speed up considerably, and the action can become quite hectic.

Eventually, though, I found running around the same simple scenario rather repetitive ... and in the end rather boring.

Loading the second tape revealed a well-presented text-only Adventure, covering at least 70 different locations in and around a rather unusual castle. Passing through the myriad of rooms you come across a number of spells; each can be entered into your Spell Book and used at your leisure. Ultimately you should reach the Wizard's throne armed with the spells capable of stopping those infernal brooms.

Most of the spells are essential to your progress, which is hindered by such delightful characters as an Egyptian mummy, a fire-breathing dragon, and even Old Nick himself.

I found this an interesting Adventure, fun to play, and rather addictive. Unfortunately though, it's yet another program the *experienced* Adventurer would do well to forget. *LP*

Phoenix

Presentation:	■■■□□
Skill level:	■■□□□
Interest:	■■■□□
Value for money:	■■■□□

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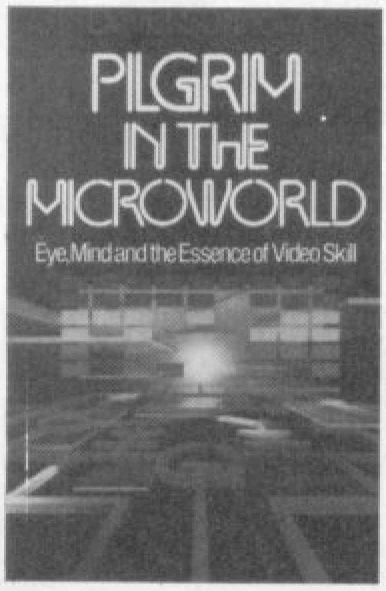
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BOOK LOOK

Pilgrim in the Microworld



The Book:	Pilgrim in the Microworld
The Author:	David Sudnow
The Publisher:	Heineman
The Price:	£5.95
The Reviewer:	Bohdan Buciak
The Conclusion:	A complete run-down on *Breakout* ... but for hardened enthusiasts only.

A video games arcade, with its wild-eyed, manic youth and cacophony of sound, looks like being a pretty fertile place for exploration if you happen to be a sociologist. But not many would take the extreme step of actually succumbing hopelessly to a video game – and then write a book about it.

David Sudnow has done just that, describing his experience as a pilgrimage through a microworld bordered by a TV screen. That amounted to him spending three months (or so he says) in virtual solitary confinement, trying to master the classic but now somewhat outdated *Breakout*. (You remember – you try to break through a wall of bricks at the top of the screen with a ball that bounces to and fro.)

So what's so special about *Breakout*? And can you really write more than 200 pages about such a simple game and not bore the reader to death? The answer probably lies in whether you're a games nut or not. Sudnow certainly wasn't before the day he retrieved his teenage son from a video arcade – that's how it all started.

But Sudnow probably wouldn't have fallen for the like of *Missile Command*. "Play *Breakout*," he extorts. "It's fun, it's gentle, you don't have to shoot missiles or people or alien beings, don't have to be a human jackhammer, rapping your finger on a button hundreds of times a minute ... Just back and forth and back and forth".

From the instant he's plugged the machine in and served the first ball, Sudnow takes us through his solitary experience chapter by chapter, recording not just his own discoveries about Breakout and how to master it, but fathoming out the depths of that disease, games-mania.

Occasionally it all becomes rather wearing on your patience. Sudnow insists on recording the minutae of his discoveries – the ways in which eyes, hand and paddles coordinate, the intricacies of strategic play, the ins and outs of developing greater skill, the problems of concentration ...

You can forgive him that; after all he *is* a scientist, eager to record faithfully every detail of his journey. What's less palatable is his liberal use of jargon – words like "neuroemotional", "motorific", "cathexis" and many more. On top of that, there's his occasional flights of rhetoric and literary fantasy. All that abstract stuff and his Americanisms may not be to your taste.

His quest took him to Atari's HQ in Santa Clara where he managed to dig up a few priceless gems of information. "I was amongst colleagues, fellow microathletes," he enthuses. So there's nothing random about *Breakout*, he discovers. You could take a perfect path from start to finish and clear the screen with a single ball. Reinforced, he returns and plays on ... and on, and on.

On a practical level, this book gives you all you ever need to know about the intricacies of playing *Breakout* and might inspire you to dust off your Atari console for a few quick serves. For the more abstract-minded, it's a passable study of a modern phenomenon. But to enjoy it, you really must have the same manic devotion to video games as Sudnow himself – and there can't be many like him around.

BOOK LOOK

Sprite Graphics for the Commodore 64



The Book:	Sprite Graphics for the Commodore 64
The Author:	Sally Greenwood Larsen
The Publisher:	Prentice Hall
The Price:	£14.35
The Reviewer:	David Bolton
The Conclusion:	Good value

***Sprite Graphics for the Commodore 64* is an unusual book as it limits itself just to one aspect of the 64. This is an American import but for once there is little of the patronising that seems to pervade a lot of American books: the author (– about time some publishers started recognising the existence of female competence) has obviously spent a good deal of time researching sprites. And the result is a book that will give you a very good knowledge of sprites.**

Good presentation, too: I particularly like the use of diagrams for explaining tricky subjects. These simplify the subject matter and are crystal clear.

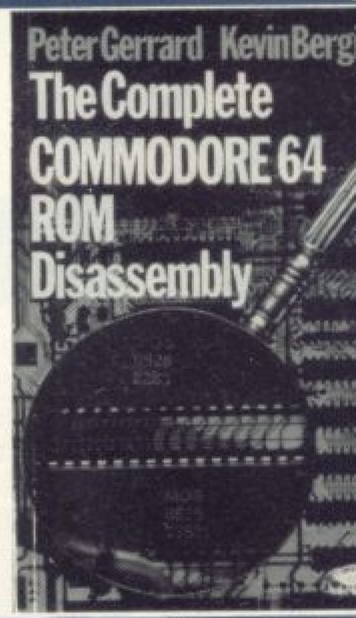
There are also four pages of colour photos showing different sprites from the 25 example programs. A few of these are three or four pages long, with some dauntingly long lists of DATA statements.

One chapter is spent solely on binary notation and boolean operations. But it is done so painlessly that few should have any trouble understanding the concepts.

The last chapter is a question-and-answer guide to problems with sprites. I must confess I knew about the dreaded 'sparkle', but I didn't realise it could trigger collision interrupts. ('Sparkle' is a phenomenon on older 64s where you get little flashes of light randomly appearing on the screen.)

If you really want to know the ins and outs of sprite programming from Basic, this book is for you. Be warned though: it does not go into the real meaty stuff of multiple sprites using raster interrupts, so if you know what that means then you are probably some way beyond the scope of this book.

The Complete Commodore 64 ROM Disassembly



The Book:	The Complete Commodore 64 ROM Disassembly
The Author:	Peter Gerrard and Kevin Bergin
The Publisher:	Duckworths
The Price:	£5.95
The Reviewer:	David Bolton
The Conclusion:	Save your money

***The Complete Commodore 64 ROM Disassembly* is identical in purpose the Milton Bathurst's *Inside the Commodore 64*, a pure reference guide for machine-code programmers and those who want to see how the machine code is written.**

There isn't a great deal to say about ROM disassemblies except for commenting on layouts and formats – and price. This book at £5.95 is under half the price of Bathurst's ... but it is lacking in content and presentation.

Pages 7 to 34 give a breakdown of all the system variables, main ROM entry points and memory map with 6526 (CIAs) and 6581 (SID) diagram charts. Surprisingly though there's no VIC chip detail: and all of this information (apart from the ROM entry points) is available in the *Programmer's Reference Guide*.

The disassembly itself is from pages 35 to 128 with about 150 bytes disassembled per page. I was annoyed to see that a disassembler has been run straight to a printer with no attempt made to document tables of commands, jump vectors, or initial values. In fact the only information given is a title at the start of each block corresponding with the ROM entry points and saying what the code does.

The reader would have to spend a great deal of time with this before obtaining any useful information. And it's my belief that any machine-code programmer could have produced this book if they had a printer, disassembler and a little knowledge about the 64.

If you want a book that will give you information about the 64 ROMs, *Inside the Commodore 64* would be a much better buy – even at twice the price.

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COMMODORE 64

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A: Autocalc 64 is ideal for any application involving extensive manipulation of data and formulae from financial planning to market research.

Q: Which spreadsheet offers an advanced level of formula handling?

A: Autocalc 64 copes easily with trignometrical functions, parenthesis and boolean logic as well as totalling and averaging.

Q: Which spreadsheet accepts complex conditional statements?

A: Autocalc 64 can handle statements as complex as IF a1<4,000 OR a1>8,000 AND a2 = 500 THEN b1=0.

Q: Which spreadsheet offers a flexible screen format?

A: Autocalc 64 allows you to select (i) column widths from 3 to 30 characters (ii) the number of rows/columns you need (iii) up to 2,000 cells of information (iv) text or numerical entries lined up to the right or the left, or a combination.

Q: Which spreadsheet offers a choice of numerical formats?

A: Autocalc 64 gives you a choice of (i) integers (ii) floating decimal point (iii) currency (iv) any combination of these.

Q: Which spreadsheet offers a full 'replicate' facility?

A: Autocalc 64 has an advanced replication function for transferring text, data, formulae or conditional statements from any cell (or block of cells) to any other(s) without monotonous retyping. A 'go to' facility will take the cursor instantly to any cell of your choice — saving time.

Q: Which spreadsheet is easy to use yet advanced in operation?

A: Autocalc 64 is designed to guide you — helpful error reports diagnose input or formulae errors. A full demonstration program and comprehensive instructions are included.

Q: Which spreadsheet is compatible with standard Commodore printers?

A: Autocalc 64 gives you a printout facility using any of these printers: Commodore 1515, 1525, MPS 801, 1526, MCS 801, DPS 1101, Seikosha GP100VC.

Q: Which spreadsheet is 100% machine code for fast efficient responses, and offers a choice of saving to disk (using 1541 drive) or to tape using a C2N unit?

A: Autocalc 64 — as if you didn't know!

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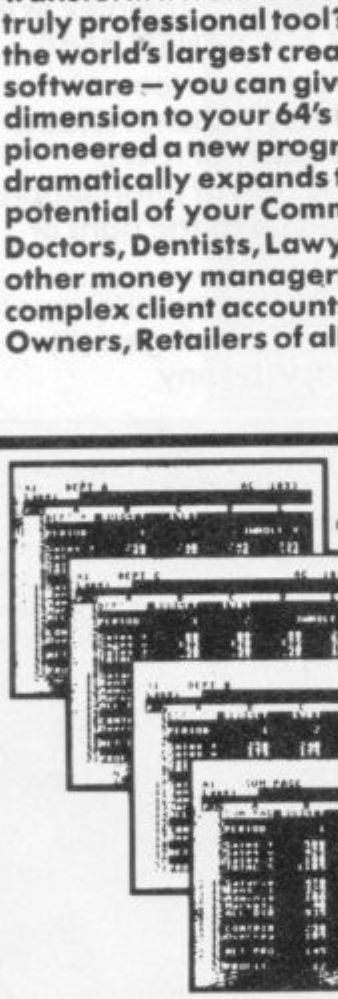
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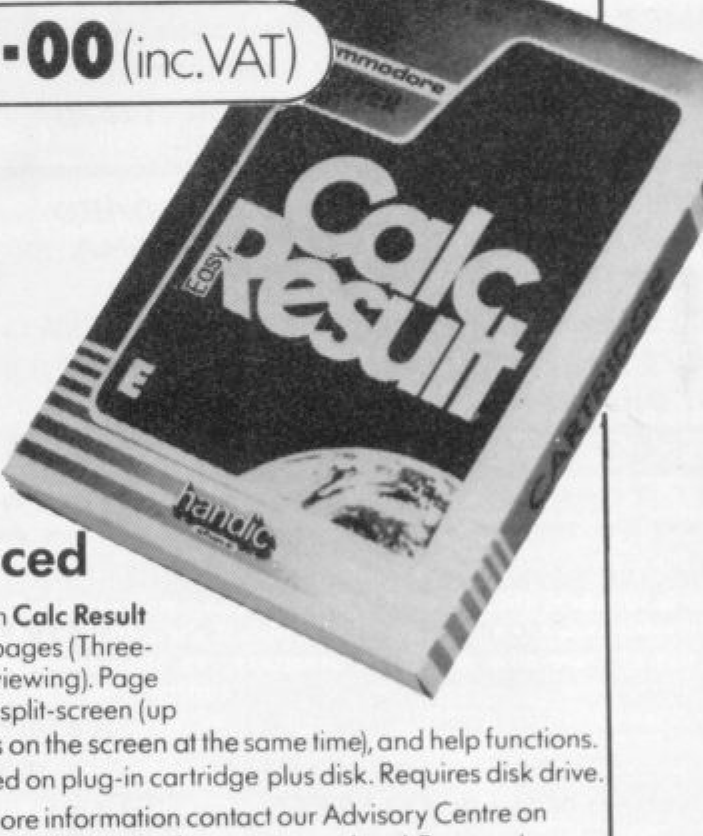
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Thinking ahead

BOOK LOOK

Getting more from your Commodore 64



The Book:	Getting more from your Commodore 64
The Author:	Mark Harrison
The Publisher:	Sigma Technical Press
The Price:	£6.95
The Reviewer:	David Bolton
The Conclusion:	Not bad, but has lots of competition

***Getting more from your Commodore 64* is another book for beginners. It is a pretty solid work spanning some 300 pages, comprehensive in scope though it falls short in the area of machine code which is described but not introduced – not a serious failing considering the nature of the book.**

Most areas are covered with plenty of examples but all listings are taken from a printer with no amendments (for instance for cursor controls). At least one appendix gives a list of control codes. I noted the odd mistake here and there through the book, but there's nothing critical.

There are a few subjects in the book which remind me of my computer science days – things like linked lists, hashing algorithms, binary trees, stacks and queues. There is also some pretty comprehensive disk treatment, including direct reading and writing sectors. You don't need a PhD to read this book, though.

My verdict? Not bad, but it has a lot of competition from similar books – this is the fourth book covering this area that I've reviewed. It seems to be the Pacman syndrome again: everybody has to bring out their own version ...

***Introducing Commodore 64 Machine Code* is a welcome change from most 64 books from a very prolific author who has written many similar books for other computers. There must be a lot of people out in 64 land who have mastered Basic, graphics, sprites and sounds and want to move on. Well, this could be the follow-on book for you.**

First, a proviso – I think that this must be the author's first venture into 6502/6510 programming as he has missed a few telling points along the way. For a start, the processor in the 64 is a *6510* not a *6502* (the difference is the addition of an I/O port).

That wasn't too bad: but saying that integer arithmetic is faster to use on the 64 than real is badly wrong. The 64 converts integers to real, does the arithmetic and converts the answers back to integer.

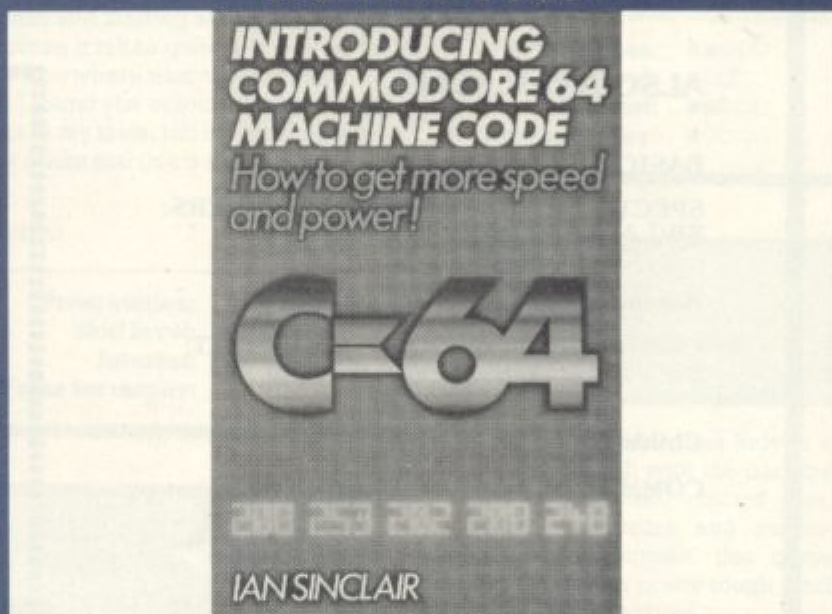
There is yet worse to come. Some of the programs listed lower the top of memory to protect machine code ... but they fail to do a CLR, so machine code would get corrupted after some string operations.

Last but not least, a major blunder: the 6510 treats the carry flag the opposite way round to the Z80 in subtraction. You *set* the carry flag, not *clear* it, before a subtraction: Ian Sinclair has got it the wrong way round. This is a mistake that will cause bugs which will be very difficult to spot.

Despite these errors the book is well written – a bit more verbose than some, but the explanations are quite detailed. And I'm pleased to see he's made extensive use of *Inside the Commodore 64* and the Mikro assembler cartridge, both favourites of mine.

My hope is that a revised second edition will come out very quickly. If this is the case then I would be glad to recommend this for the budding machine code programmer. As it stands though there are these annoying mistakes: so caveat emptor!

Introducing Commodore 64 Machine Code



The Book:	Introducing Commodore 64 Machine Code
The Author:	Ian Sinclair
The Publisher:	Granada
The Price:	£7.95
The Reviewer:	David Bolton
The Conclusion:	Annoying mistakes

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Our regular round-up of games reviews

We get to see a lot of games here at Commodore User, so many in fact that we can't handle all the reviewing ourselves – we farm out some of them, which is why our reviews have someone's initials at the end of them. We look at everything we get, but we don't necessarily print all the reviews we write: instead, we tend to stick with (a) all the best games we come across and (b) those games that you're most likely to find in the shops or the mail order ads.

Screen Scene

MINITRON
Vic-20 (Unexpanded)
Joystick only
Price £4.95

This game manages to annoy before you've even grabbed your joystick. The futuristic insert belies a screen that's really bare and boring, and the sci-fi story on the cover does nothing to tell you why you're zapping.

Oh well, better make an effort. Apparently, you're one of a small number of men surviving on a planet completely overrun by robots. Or maybe you're a robot? Anyway, there are mines, and things that could pass for robots to zap. That puts up your score. Then there's the little men walking across the screen. Do you zap them too, or are they robots that look like men? Trouble is, I can't be bothered to find out. BB

Anirog

Presentation:	■■□□□
Skill level:	■■■□□
Interest:	■□□□□
Value for money:	■□□□□



PHANTOM ATTACK
Vic-20 (Unexpanded)
Joystick only
Price £1.99

You can't expect much from a game that costs a chiclet under £2.

But in terms of presentation, this one's got a lot to offer. Title sequences scroll and change colour, and there's a veritable cacophony of throbbing and screeching sounds. Pretty impressive.

What about the game itself? Well, it's just a little less than lousy – one of those keep-your-finger-on-the-button games. Apparently, you're supposed to be zapping a row of phantoms at the top of the screen which grow to full size and then swoop down on top of you. The blurb says the phantoms have fired a missile at you. Beats me.

But the effects are pretty spectacular especially since the attack formations vary and become more intricate as the waves progress. It's all very bright, colourful and fast action. Graphics are a pretty high standard for the Vic. Apart from that, there's not much else to recommend this offering. BB

Mastertronic

Presentation:	■■■■□
Skill level:	■□□□□
Interest:	■□□□□
Value for money:	■■■□□

SKRAMBLE
Unexpanded Vic 20
Joystick only
Price £5.99

The full assault-and-battery course in 3.5K is a tall order; nevertheless all the features are here.

Fuel dumps are tucked away in the rocky terrain and there are interceptor rockets aplenty to avoid or zap in the first section. The subterranean sector is really in two parts: the first being spacious with bouncing spiders to dodge, though it is easier to shoot them; suddenly the cavern becomes narrower and more tortuous with stalactites posing problems. Homing fireballs greet your return above ground followed by more rockets which crowd the city blocks. Then it's just a matter of negotiating the city-maze and landing at home base. Of course it takes quite a few goes to get anywhere near the terminus.

I found the colour combinations not to my taste, but the sonics leave no doubt that this is a strafing run.
LS

Rabbit

Presentation:	■■□□□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■□□

SKRAMBLE
Vic-20 (any)
Joystick or keyboard
Price £7.95

This version of *Skramble* must be one of the worst I have yet seen.

Your task in this shoot 'em game is to destroy all your enemy missile bases, guided missile launchers and fuel dumps in their underground silo. Your fighter ship has to pass through some tough, rugged terrain under constant attack from guided missiles; and if that wasn't enough you have a dwindling supply of fuel which can only be replenished by accurately bombing enemy fuel dumps.



But anyhow this version is pretty poor; the fire balls have no effect on you whatsoever, and the jerky movement and the fair-to-poor graphics go to make this a scourge on the name of *Skramble*. The only good thing about this game is the sound. BJ

Livewire

Presentation:	■■□□□
Skill level:	■□□□□
Interest:	■■□□□
Value for money:	■□□□□

PUNCHY
Vic-20 (+16K)
Joystick or keyboard
Price £9.90

So you think Punch and Judy is a soft touch? Well, with the barrage of rotten tomatoes, custard pies, snapping alligators and pugnacious Punch himself, this game looks like being pretty tough. And pretty good fun to boot.

You're Bobbie the policeman, given the job of rescuing Judy who Punch has maliciously locked away in the booth. Brave Bobbie must run across a series of stage scenes, avoiding the edible nasties and jumping over various holes and pits in which Punch and the alligator lurk – not dissimilar in style to *Hunchback* on the Commodore

64. If he makes it to the end, he will free Judy from bondage.

Occasionally an express sausage (sent from Judy) soars past. Catch three of those and Bobbie gets a free trip to the next screen.



But many of the screens repeat themselves, albeit with a few minor differences – but what do you expect for 16K?

Generally, this game is extremely well presented, especially in terms of colourful and vivid graphics.Can the Vic really do any more than this? There's a useful demonstration at the beginning, a high-score table, reasonable sound and lots of instructions on the insert. But with 16 screens to negotiate, Judy might be better off digging a tunnel. Definitely more fun than the beach at Bognor. *BB*

Mr Micro

Presentation:	■■■■■
Skill level:	■■■■□
Interest:	■■■□□
Value for money:	■■■■□

RACE FUN
Unexpanded Vic 20
Joystick or keyboard
Price £5.99

Much better than the 64 version. Larger variously coloured vehicles career towards your own car, which apart from moving laterally can also accelerate and brake. It's just a case of how long you can survive a bout of nightmare driving.

Worth considering if your reflexes are razor sharp and so long as you can tolerate the roar of speeding traffic. Not much time to appreciate the graphics, though.

Rabbit *LS*

Presentation:	■■■■□
Skill level:	■■■□□
Interest:	■■■□□
Value for money:	■■■■□

SPACE ESCORT
Unexpanded Vic 20
Joystick or keyboard
Price £5.99

A fast-moving arcade game, with you escorting a convoy of 26 space liners to their base planet – your task on the way is to defend the convoy with your fighter ships.

The liners themselves have four colour-coded protective shields; each time a liner is hit by an alien ship (or random meteors) one shield is destroyed.

When first playing the game you'll find the speed devastating – just the slightest movement of the joystick and you go zooming across the screen straight into the alien ships (or you might go crashing into your own liners, as I did more than once!). Control takes some time to get used to: but once this hurdle is over the game becomes a little easier.

The sound and graphics are quite good; each new wave of aliens make a different sound to the last. And I enjoyed playing this game! *BJ*

Romik Software

Presentation:	■■■□□
Skill level:	■■■■□
Interest:	■■■□□
Value for money:	■■■□□

STAR DEFENDER
Vic-20 (+16K)
Joystick or keyboard
Price £7.95

Remove the star and what do you have? Yes, you have that good old arcade favourite *Defender*.

For the uninitiated, you're in command of the last space fighter



in your fleet. You have to stop the alien landers from picking up and carrying off your humans.

But this version has a trick or two, such as your ship being able to become invisible for five seconds; very handy. And also you have the 'star-gate' which transports you somewhere in space.

There are the mandatory aliens to face, things like 'Mutants', 'Baiters' and 'Space-hums'. These Space-hums fly behind you and try to collide with you; Baiters arrive if you have not destroyed after a certain time. The mutants appear when a lander takes a human to the top of the screen; there he/she/it mutates and will attack you with mindless vengence.

The graphics and sound are quite good: large well-defined aliens and smooth graphics makes *Star Defender* one of the best versions of *Defender* yet produced. A good game all round. BJ

Anirog

Presentation:	■■■■□
Skill level:	■■■□□
Interest:	■■■□□
Value for money:	■■■□□

TANK COMMANDER

Vic-20 (+8K)
Joystick or keyboard
Price £5.95

Your mission, should you decide to accept it, is to take your tank into enemy country and blow up the fuel and ammunition dump.Sounds like a piece of cake? Apart from mines and swamps, a few enemy tanks and a fighter jet, it's plain sailing – or plain tanking.

The nice thing about this game is that you can take your time and use a little strategy. Actually, that isn't optional; tanks don't exactly speed along and manouvering is pretty sluggish. And don't fire too often. You've got a limited amount of shells (displayed at the bottom of the screen).

Nice features include a screen that scrolls both horizontally and vertically, there's a one or two player option and the instructions provided are pretty comprehensive. Not a classic but a nice alteration to manic zapping. BB

Creative Sparks

Presentation:	■■■□□
Skill level:	■■□□□
Interest:	■■■□□
Value for money:	■■■□□

TOWER OR EVIL

Vic-20 (+8K)
Joystick only
Price £5.95

This game is not quite as menacing as the title and insert make out. Despite that, it's pretty good fun.

You're in an oblong room with an exit to either side through which the nasties come in. If there's no treasure in there, zap you're way through the nasties, make a quick exit and you're in another room. Apparently there's sixty of them but they all look identical – bit of a con? The idea is to rove the rooms grabbing as much treasure as possible to rescue some vapid creature called Princess Diana – no relation.

Occasionally, a transporter thing appears which you rush into. That seems to change the type of nasty. There's three of those: one of them fires back. I reckon those are the Baphonets. You deposit treasure when you reach level seven and that rescues the princess.

Graphics are less than stunning, so is the sound, but action is swift and furious. Definitely worth a few loads. BB

Creative Sparks

Presentation:	■■■□□
Skill level:	■■■■□
Interest:	■■■□□
Value for money:	■■■□□



Tinymon *by Jim Butterfield*

One of the things you may miss on the Vic is a machine language monitor; it's not there – unless you go out and pay for one. But for occasional use, a tape-loadable monitor might be very handy.

This one dates from 1982, when we originally printed it in Vic Computing. Since then we've had many requests for a reprint. It should fit on any Vic, with or without extra memory added; and it honours all the commands from the built-in monitors we know from Pet/CBM usage. One minor syntax change: the two addresses of the Memory display command (.M) should be separated by a space rather than a comma.

It is not really practical to type TINYMON 1 directly into a Vic. DATA statements in decimal would take up more room than is available in small Vics; and hex entry would need a monitor to be in place already. So I've prepared the program so that it can be entered on a Pet and saved on tape. After it's been created once, the Vic can make its own copies.

You'll need a Pet with Upgrade ROM or 4.0 ROM to do the job, since the Original ROM Pets don't have a machine language monitor and things would get too complicated.

Using TINYMON

TINYMON 1 loads like a Basic program, and copies can be made with a simple LOAD and SAVE sequence as you would do with Basic. When you load TINYMON 1 and say RUN, however, some interesting things happen ... the monitor system is repacked into the top of memory, and it will stay there until you turn the power off. You can say **.X** to return to Basic and load and run Basic programs, providing they are not too big. TINYMON 1 grabs about 760 bytes of memory, so you lose a little space.

Once you're back in Basic, the question arises: how can you invoke TINYMON 1 when desired? Not an easy trick, since memory is more mobile in the Vic than in the pet. The thing to do is find a zero value in memory and SYS to that location. If you have an unexpanded Vic, SYS 4096 is safe. The sure way is to PEEK first and ensure that there's a zero there (location 10 is often zero).

TINYMON 1 must be considered preliminary. It was designed with two major considerations: to use minimum space, and to load automatically into any Vic regardless of the memory fitted.

The space consideration is fairly obvious: with 3,500-odd bytes available on a small Vic, you want to use up as little as possible. The automatic load feature was tricky to implement; Vic may relocate programs as it loads. What's more, the screen area tends to move around as you add memory.

I scratched my head over the **.S** (Save) command. If Vic automatically relocates programs during loading, will a SAVEd machine language program be safe? As it turns out, Vic has a new tape format available – when a tape is written, it may be defined as 'absolute' and will not relocate when it loads. This seems the best compromise, but it has one drawback – the Pet won't load this type of tape. Perhaps that's a design decision that will need to be revised ...

Finding space

Vic is desperately short of zero page space; machine-language programmers will have to cope with the shortage as best they can. I have used the same locations that the Commodore VICMON monitor uses. There's a difference, however – the Commodore job will swap out selected parts of zero page and put them back later; I don't want to give up the space for that kind of luxury. As a result, you may be annoyed by some locations that are disturbed by TINYMON 1.

For those unfamiliar with the Pet machine language monitor, the commands are:

.R – *display 6502 registers*
Users can use screen editing to type over a display and change the registers

.M FFFF TTTT – *display memory* (from ... to);
Users can use screen editing to type over a display and change memory

.X – *exit to Basic*
It may be wise to type CLR in Basic after exiting

.G AAAA – *GOTO (execute) address*

.S "PPPP",01,FFFF,TTTT – *Save (program-name, device, from, to)*

.L "PPPP" – *Load (program-name)*

There's a delicate tradeoff between features and memory space. There will undoubtedly be other small monitors with a different balance. In any case, I wrote one because I had nothing ... and others in the same position will undoubtedly greet TINYMON 1 with glad cries.

Entering TINYMON

Enter a Pet, using the machine language monitor. Do not try to RUN, but follow your entry with the checksum program, Program 2.

First, make the following change:

.: 0028 01 04 14 08 14 08 14 08

Now, enter TINYMON 1:

```
.:  0400 00 18 04 64 00 99 22 93
.:  0408 11 11 12 1D 1D 1D 20 54
.:  0410 49 4E 59 4D 4F 4E 20 00
.:  0418 31 04 6E 00 99 22 11 20
.:  0420 4A 49 4D 20 42 55 54 54
.:  0428 45 52 46 49 45 4C 44 22
.:  0430 00 4C 04 78 00 9E 28 C2
.:  0438 28 34 33 29 AA 32 35 36
.:  0440 AC C2 28 34 34 29 AA 30
.:  0448 37 38 29 00 00 00 EA EA
.:  0450 A5 2D 85 22 A5 2E 85 23
.:  0458 A5 37 85 24 A5 38 85 25
.:  0460 A0 00 A5 22 D0 02 C6 23
.:  0468 C6 22 B1 22 D0 3C A5 22
.:  0470 D0 02 C6 23 C6 22 B1 22
.:  0478 F0 21 85 26 A5 22 D0 02
.:  0480 C6 23 C6 22 B1 22 18 65
.:  0488 24 AA A5 26 65 25 48 A5
.:  0490 37 D0 02 C6 38 C6 37 68
.:  0498 91 37 8A 48 A5 37 D0 02
.:  04A0 C6 38 C6 37 68 91 37 18
.:  04A8 90 B6 C9 BF D0 ED A5 37
.:  04B0 85 33 A5 38 85 34 6C 37
.:  04B8 00 00 00 00 00 00 00 00
.:  04C0 BF 78 AD FE FF 00 AE FF
.:  04C8 FF 00 8D 16 03 8E 17 03
.:  04D0 A9 80 20 90 FF 58 00 00
.:  04D8 68 85 05 68 85 04 68 85
.:  04E0 03 68 85 02 68 85 01 68
.:  04E8 85 00 00 BA 86 06 38 A5
.:  04F0 01 E9 02 85 01 A5 00 00
.:  04F8 E9 00 00 85 00 00 20 B2
.:  0500 FE 00 A2 42 A9 2A 20 DB
.:  0508 FD 00 A9 52 D0 1C A9 3F
.:  0510 20 D2 FF 20 B2 FE 00 A9
```

```
.:  0518 2E 20 D2 FF A9 00 00 85
.:  0520 27 20 40 FE 00 C9 2E F0
.:  0528 F9 C9 20 F0 F5 A2 07 DD
.:  0530 E6 FF 00 D0 12 85 1C 8A
.:  0538 0A AA BD EE FF 00 85 C1
.:  0540 BD EF FF 00 85 C2 6C C1
.:  0548 00 00 CA 10 E6 4C 4B FD
.:  0550 00 20 BD FD 00 90 F8 20
.:  0558 EE FD 00 20 BD FD 00 90
.:  0560 F0 20 EE FD 00 20 4C FE
.:  0568 00 F0 1F 20 B2 FE 00 A2
.:  0570 2E A9 3A 20 DB FD 00 20
.:  0578 C5 FD 00 A9 05 20 6F FE
.:  0580 00 A5 C3 C5 C1 A5 C4 E5
.:  0588 C2 B0 DF 4C 50 FD 00 4C
.:  0590 50 FD 00 20 FE FD 00 85
.:  0598 C1 86 C2 60 A5 C2 20 CC
.:  05A0 FD 00 A5 C1 48 4A 4A 4A
.:  05A8 4A 20 E4 FD 00 AA 68 29
.:  05B0 0F 20 E4 FD 00 48 8A 20
.:  05B8 D2 FF 68 4C D2 FF 18 69
.:  05C0 F6 90 02 69 06 69 3A 60
.:  05C8 A2 02 B5 C0 48 B5 C2 95
.:  05D0 C0 68 95 C2 CA D0 F3 60
.:  05D8 20 0D FE 00 90 07 AA 20
.:  05E0 0D FE 00 90 01 60 4C 4B
.:  05E8 FD 00 A9 00 00 85 2A 20
.:  05F0 40 FE 00 C9 20 F0 F9 20
.:  05F8 20 FE 00 90 17 20 40 FE
.:  0600 00 C9 30 90 10 20 35 FE
.:  0608 00 06 2A 06 2A 06 2A 06
.:  0610 2A 05 2A 85 2A 38 60 C9
.:  0618 3A 08 29 0F 28 90 02 69
.:  0620 08 60 20 CF FF C9 0D D0
.:  0628 F8 68 68 4C 50 FD 00 A5
.:  0630 91 C9 FE D0 05 08 20 CC
.:  0638 FF 28 60 20 61 FE 00 2C
.:  0640 2D 91 30 F8 60 20 4C FE
.:  0648 00 D0 08 A9 03 85 9A A9
.:  0650 00 00 85 99 60 85 1E A0
.:  0658 00 00 20 AF FE 00 B1 C1
.:  0660 20 CC FD 00 20 A4 FE 00
.:  0668 C6 1E D0 F1 60 20 0D FE
.:  0670 00 90 0B A2 00 00 81 C1
.:  0678 C1 C1 F0 03 4C 4B FD 00
.:  0680 20 A4 FE 00 C6 1E 60 A9
.:  0688 02 85 C1 A9 00 00 85 C2
.:  0690 A9 05 60 E6 C1 D0 06 E6
.:  0698 C2 D0 02 E6 27 60 A9 20
.:  06A0 2C A9 0D 4C D2 FF A2 00
.:  06A8 00 BD D0 FF 00 20 D2 FF
.:  06B0 E8 E0 16 D0 F5 20 B2 FE
.:  06B8 00 A2 2E A9 3B 20 DB FD
.:  06C0 00 A5 00 00 20 CC FD 00
.:  06C8 A5 01 20 CC FD 00 20 99
.:  06D0 FE 00 20 6F FE 00 4C 50
.:  06D8 FD 00 20 FE FD 00 85 01
.:  06E0 86 00 00 20 99 FE 00 85
.:  06E8 1E 20 83 FE 00 D0 FB F0
.:  06F0 EA 20 BD FD 00 A9 05 85
.:  06F8 1E 20 83 FE 00 D0 FB F0
.:  0700 DC 20 CF FF C9 0D F0 07
.:  0708 20 BD FD 00 85 01 86 00
.:  0710 00 A6 06 9A A5 00 00 48
.:  0718 A5 01 48 A5 02 48 A5 03
.:  0720 A6 04 A4 05 40 78 A6 06
.:  0728 9A 6C 02 C0 4C 4B FD 00
.:  0730 A0 01 84 BA 84 B9 88 84
.:  0738 B7 84 90 84 93 A9 02 85
.:  0740 BC A9 40 85 BB 20 CF FF
.:  0748 C9 20 F0 F9 C9 0D F0 1A
.:  0750 C9 22 D0 D9 20 CF FF C9
.:  0758 22 F0 26 C9 0D F0 0B 91
.:  0760 BB E6 B7 C8 C0 10 F0 C5
.:  0768 D0 EA A5 1C C9 4C D0 E2
.:  0770 A9 00 00 20 D5 FF 20 58
.:  0778 FE 00 A5 90 29 10 D0 F0
.:  0780 4C 50 FD 00 20 CF FF C9
.:  0788 0D F0 E2 C9 2C D0 F0 20
.:  0790 0D FE 00 29 0F F0 D3 C9
.:  0798 03 F0 FA 85 BA 20 CF FF
.:  07A0 C9 0D F0 CA C9 2C D0 E6
.:  07A8 20 BD FD 00 20 CF FF C9
.:  07B0 2C D0 F4 20 FE FD 00 85
.:  07B8 AE 86 AF 20 CF FF C9 20
.:  07C0 F0 F9 C9 0D D0 EC A5 1C
.:  07C8 C9 53 D0 F8 20 B2 FE 00
.:  07D0 A9 01 85 B9 20 82 F6 4C
.:  07D8 50 FD 00 0D 20 20 20 50
.:  07E0 43 20 20 53 52 20 41 43
.:  07E8 20 58 52 20 59 52 20 53
.:  07F0 50 4D 52 58 49 3A 3B 4C
.:  07F8 53 86 FD 00 B7 FE 00 23
.:  0800 FF 00 02 FF 00 F4 FE 00
.:  0808 E1 FE 00 2D FF 00 2D FF
.:  0810 00 1B FD 00 00 00 00 00
```

The checking program

Whew! TINYMON 1 for the Vic is now entered. Check it with the following program. Type the following direct line on the screen of your Pet.

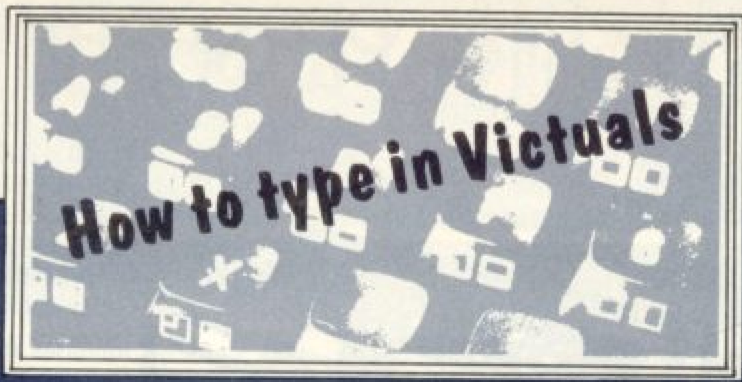
for j = 1024 to 2071 step 8: t = 0: for k = j to j + 7: t = t + peek (k): next: ?t;: next

You should see the following numbers appear on the screen of your Pet. Check them carefully. Each one represents one line of entry, starting at 0400 hexadecimal. If any of those totals are wrong, you've entered the line incorrectly.

462 255 506 399 575 541 592 511 (0400)
769 620 756 780 802 910 886 853
801 784 876 840 835 1383 753 0
1422 589 816 720 584 680 535 576
944 972 1130 845 876 1357 1010 1188 (0500)
1311 852 898 1109 1125 897 809 1021
1340 1078 1005 1212 905 902 770 1239
762 1133 1388 652 659 629 1072 803
748 150 617 413 1020 1030 1057 818 (0600)
944 844 705 831 939 1072 639 1033
943 824 1137 970 929 1149 1395 940
654 840 807 926 706 1146 1015 1146
1175 742 563 645 695 860 1064 1042 (0700)
1235 1202 1355 922 1445 1346 789 1068
1104 1204 975 1306 1339 1169 1168 1210
1340 1204 972 522 460 520 591 942
1010 1079 280 (0800)

(The numbers in parentheses appearing to the right won't appear on your screen; they are there to help you locate an incorrect line). When you are satisfied that the program is entered correctly, SAVE it to cassette tape. It may now be loaded into your Vic.

Editor's note: If you don't have access to a Pet, there's a good method of loading TINYMON directly into a Vic that's contained in *COMPUTE's First Book of Vic* (an excellent compilation of articles from the excellent US magazine *COMPUTE!*). That article – by one Russell Kavanagh – is a lengthy exposition via a voyage of discovery into how Basic statements work and how TINYMON itself is constructed. The result is a laborious but effective direct-input job that seems to work; highly recommended. ●



How we reproduce listings

We have two methods of presenting listings. When we can, we run them through a converter program that replaces the hieroglyphic control codes with more meaningful symbols.

When you see...	It means ...	And you ...
[CUP]	cursor up	press the 'cursor up' key (shifted)
[CUD]	cursor down	press the 'cursor down' key
[CUL]	cursor left	press the 'cursor left' key (shifted)
[CUR]	cursor right	press the 'cursor right' key
[HOM]	cursor to the top lefthand corner	press the HOME key
[CLR]	clear	press the CLR key (shifted)
[INS]	insert	press the INSert key (shifted)
[BLK]	change to black	press the BLK key (CTRL and 1)
[WHT]	change to white	press the WHT key (CTRL and 2)
[RED]	change to red	press the RED key (CTRL and 3)
[CYN]	change to cyan	press the CYN key (CTRL and 4)
[PUR]	change to purple	press the PUR key (CTRL and 5)
[GRN]	change to green	press the GRN key (CTRL and 6)
[BLU]	change to blue	press the BLU key (CTRL and 7)
[YEL]	change to yellow	press the YEL key (CTRL and 8)
[RVS]	reverse on	press the RVS ON key (CTRL and 9)
[RVO]	reverse off	press the RVS OFF key (CTRL and 0)
[SPC]	space	press the space bar; repeat the specified number of times

These listings we generally run out on a letter-quality printer, though, and conventional graphics can't be handled on a daisywheel. So some listings are done on a Commodore printer, in which case you may see the standard control codes:

```
CLR           ...  ■  (REVERSED HEART)
HOME          ...  ■  (REVERSED S)
RVS ON        ...  ■  (REVERSED R)
RVS OFF       ...  ■  (REVERSED UNDERSCORE)
CURSOR UP     ...  ■  (REVERSED SHIFTED ●)
CURSOR DOWN   ...  ■  (REVERSED Q)
CURSOR LEFT   ...  ■ (REVERSED UPWARD BAR - SHIFTED H)
CURSOR RIGHT  ...  ■ (REVERSED LEFT SQUARE BRACKET)

SET COLOUR TO
          BLACK  ...  ■  (REVERSED SHIFTED P)
          WHITE  ...  ■  (REVERSED E)
          RED      ...■  (REVERSED £)
          CYAN   ...  ■  (REVERSED COMMODORE-SHIFTED *)
          PURPLE ...  ■  (REVERSED COMMODORE-SHIFTED -)
          GREEN  ...  ■  (REVERSED UP ARROW)
          BLUE   ...  ■  (REVERSED LEFT ARROW)
          YELLOW ...  ■  (REVERSED PI SIGN)
THE FUNCTION KEYS CAN BE INCORPORATED INTO PRINT STATEMENTS TOO.
AS WITH THE OTHER NON-ALPHANUMERIC KEYS, THEY APPEAR AS SPECIAL"

SYMBOLS IN A LISTING:
F1  ... ■                   F2  ... ■
F3  ... ■                   F4  ... ■
F5  ... ■                   F6  ... ■
F7  ... ■                   F8  ... ■
```

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c = Cassette Ca = Cartridge D = Disk

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COMMODORE user

A PARADOX PUBLICATION

Deals for Readers

Welcome to DEALS FOR READERS, a collection of Special Offers from Commodore User Magazine.

This Catalogue offers you excellent deals on Vic and 64 products. Some of them, like the dustcovers and the Victuals tapes, we have produced ourselves. The others are things that we regard as Good Ideas and Good Value, mostly items we reviewed in Commodore User before we decided to sell them. On most of those we have fixed up discounts for readers (while we aren't allowed to sell books at cut price, we can include P&P in our price).

If you want to take up any of the offers, just use the Order Form on the back page. And take a look through the Catalogue: even if you don't want to buy now, we'd like to know what you might be interested in seeing in future DEALS FOR READERS catalogues – let us know in the space provided on the Order Form.

Video Splitters

Aerial and computer both on your TV! Video splitters

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No more boring fiddling around to change the plugs, no more unnecessary strain on the wiring!

£1.75



A RECOMMENDED ASSEMBLER

for Vic or 64

Tape: £17.95
Disk: £19.95

Our reviewer (June 1983 issue) concluded that Elmhirst's OSIRISAN assembler was "good value at the price." So we signed up to sell it.

Fast, commonsense operation, good features and lots of them, full error reporting... what more could you ask of an assembler? Except maybe an editor package.

And – would you believe – it comes with FREDITOR, a general-purpose text editor that can be used for *any* text (as a mini-word processor) and /or to create a source file for the assembler. Features save, move, erase, search, instant replace.

DESIGN YOUR OWN VIC SCREENS



Brilliant idea, though it's simple really: the Cybergram Designs Vic-20 Graphics Aid Pack is a set of overlays and printed sheets on which you can design screen displays. With them you can immediately see the POKE locations you need for display and colour; and you can use successive sheets to set up a specific 'storyboard' from which to organise and visualise the sequences in a graphics program.

Your pack includes planner sheets for the standard 22 x 23 screen and plotter sheets for 1023 x 1023 hi-res graphics using the Super Expander; you also get a set of handy character designer sheets that simplify the construction of your own shapes.

Very neat, very clever – and really useful too. We're glad we can offer the Graphics Aid Pack to you... and at a discount on the normal RRP of £4.50.

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Normal price: £16.95
OUR PRICE: £9.95



Special Offer: *When you upgrade your system to use a disk drive, INFODISK will be able to retrieve your tape records – and your INFOTAPE order from us comes with a £20 off voucher against the disk version!*



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VIC: ALL YOU NEED TO KNOW

VIC 20 User Guide by John Heilborn and Ran Talbott, published by McGraw-Hill.

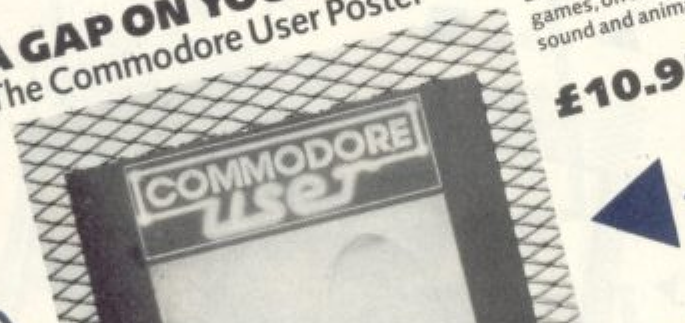
There are dozens of books about the Vic. But this one is the best all-rounder we've come across. Not cheap, maybe: but you get a beefy large-format paperback of 387 pages, packed with information and beautifully presented with professional illustrations and clear listings.

Ideal for beginner and expert alike. Hand-holding intro to the Vic; but also includes 'how to use' sections on disk and printer as well. Excellent on graphics and animation, on writing games, on sound (eg a good chunk on combining sound and animation).

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A GAP ON YOUR WALL?

The Commodore User Poster



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Remember our February cover, with the enigmatic monk-cum-Renaissance Man looking for the cause of his SYNTAX ERROR?
Well, we produced a poster version of it – and we have a few left over to the first 150 lucky customers. Printed in stunning colour on glossy high-quality paper, A3 size (about 16.5 by 23ins). Just the thing for your bedroom/clubroom/ computer room wall...

TWO

better programs,

We've commissioned two special add-ons for the 64 from Whitby Computers, another company whose products we reviewed and liked. Just look what you get:

DAVID'S BASIC

... for better programs

Ways with numbers:
AVG averages elements in an array of numbers
SUM sums elements in an array
MIN finds the smallest number in an array
MAX finds the largest

Ways with strings:
PAD$ fills out a string with spaces
BLANK tests a string to see if it's blank or contains only spaces
SEARCH searches array for given string or pattern
SORT sorts arrays
SPC$ gives a string with a specified number of spaces

Coping with keys:
BREAK cancels the RUN/STOP and RESTORE reset
DISABLE kills RUN/STOP
NOKEY kills effect of specified keys

Extra goodies:
CHINKLE rings a bell
ERROR intercepts program errors, lets you branch to an error-handling routine

Cleverer programming:
CIF conditional IF
CEND conditional END
ELIF ELSE IF
ELSE ELSE
POP removes last subroutine from stack – garbage collection, avoids 'out of memory' errors
PUSH puts a subroutine return address on to stack – simulates GOTO
EXEC a bit like PROC or labelled subroutines – executes a previously specified string as a Basic statement
GTO GOTO a line with a REM followed by a label
GSUB ditto for a GOSUB
ROUT as for DEF FN, but allows you to define multiple-line routines
PER performs routines created by ROUT
ON used as ON <key> GOTO or GOSUB – quick and easy form of GET and subsequent tests
SCAN scans string for given character
SWAP loads another program, retaining all variables
SHR$ compresses a number for compact storage
XPD decompresses a number for use
RESTORE as normal, but can also be used to RESTORE to a given line number

Defter displays:
CLOCK continuously displays the time at stated position
COL$ simplifies use of the 15 colours
CURSOR puts the cursor at the specified x/y position
LWIND Load Window – loads a ready-to-go screen display from disk
SWIND Save Window – creates that display
DISP displays centered message

Easier input:
DATE$ turns a numeric date back into a conventional date string format
DATIN foolproof date input routine
GENIN foolproof input routine – checks input against specified pattern of acceptable characters
NUMIN foolproof numerical input

Perfect printing:
PRINT% automatically justifies columns of money figures
PRINT£ adds true printer tabs
SCOPY screen copy
PCTRL Printer Control – sets device number and other characteristics: one command thus lets you handle different printers from a program
QUME$ use a Qume daisywheel printer for plotting

PRICE: **£27.50**

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Sticky keytops? Things falling past the keys into the computer? Don't take the chance. When you're not using your Vic or 64, slip over one of our tailored Commodore User dustcovers – a smart black number featuring the magazine's logo on top. They do keep out dust, but they'll also cope with coffee splashes (anything less than a thunderstorm in fact!), paperclips, cigarette ash, the residue of longhaired cats, and the general detritus of daily life. One size fits all.

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CARTRIDGES FOR THE 64

easier programming!

THE COMMODORE USER TOOLKIT ...for easier programs

What everyone needs:
AUTO automatic line numbering
DELETES deletes specified lines
EDIT deletes forwards – uses RUN/STOP to delete, leaves the cursor where it is
FIND lists all lines containing specified string
HELP lists line where error occurred
LINES instantly calculates the number of lines in your program
MERGE merges program from disk or tape, interleaving lines if necessary
RENU renumber program (including GOTOs, THENs, GOSUBs, etc)
REPLACE finds all occurrences of given string and replaces them with a specified string
TRACE displays last six lines executed in top right corner of screen during execution

Handy for variables:
DUMP lists names and current values of all non-array variables
VAR lists variable names

Sexy sprites:
DESIGN multi-colour sprite editor
SPRITE sets position, colour, mode (expanded, multicolour, transparent) for sprites; turns them on and off
HITBACK detects sprite hitting background
HITSPR detects sprite hitting another sprite
SSPRITE saves sprite data to tape or disk
LSPRITE loads sprite data

Neat extras:
MON Pet-type machine code monitor – commands for display memory and registers, load and save memory blocks, SYS-type execute, return to Basic
USER allows you to add new command words – commands must be previously written in machine code
FUNC defines function keys (the cartridge gives them useful default meanings anyhow, but they can be changed with this)
RESCUE rescues inadvertently NEWed program
SHRINK removes REMs and all unnecessary spaces
CURSOR puts the cursor at the specified x/y position
KILL removes Toolkit commands

PRICE: **£27.50 SPECIAL BARGAIN OFFER:** order the two at the same time and save a fiver – £50 for the pair!

Cut out those SAVE/LOAD errors!

Read/write errors from tape? Mucky keyboard? Grubby screen? Dirt on the tape heads can be infuriating; and who wants a tatty-looking computer?

The Complete Cleaning Kit

Here's the answer – an all-purpose Vic/64 cleaning kit. It contains...

★ head cleaner for the cassette deck
★ a pack of special lint-free wiping cloths to use with...
★ aerosol can of anti-static foam cleanser to lift off grease and dust
★ ten anti-static dust-repellent screen wipes
★ a package of lint-free cotton bud sticks for those hard-to-get at places (ears?), to use with...
★ aerosol can of safe, residue-free cleaning fluid for awkward bits of the tape deck

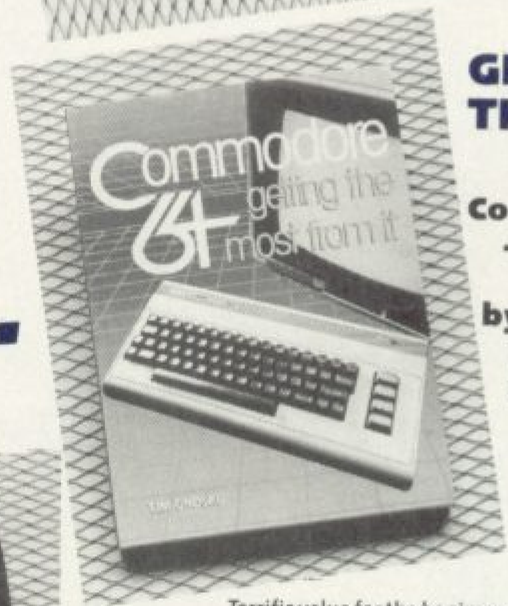
What excuse can you have now?





KEEP IT CLEAN

GET INSIDE THE 64



Commodore 64 – getting the most from it by Tim Onosko, published by Prentice-Hall.

£7.95

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A Bigger Basic: The DEF function

Getting more out of your programming

by Chris Preston

An occasional series in which Chris looks at the less well explored regions of Commodore's Basic – there's more to Basic than you'll find in the beginners' handbook!

This time he looks at one of the most under-used and ill-understood features of the Basic language. The DEF FN statement may be under-utilised: yet it is tremendously useful, especially if you have a lot of calculations to do.

The "User-Defined Function" (as it is known) is just as useful (and for many of the same reasons) as a GOSUB, and how many people could do without that? Many people do buy computers to perform complex calculations, but never overcome their fear of this quite harmless statement.

Let's look at an example of when we might use the DEF FN statement. The formula for the area of a circle is...

```
AREA = PI * RAD * RAD
```

... where RAD contains the radius of the circle and PI holds (would you believe) the value of pi. (Notice that it is often quicker to write RAD*RAD than RAD 2.)

Now we might have a number of equations where the expression PI*RAD*RAD is needed, such as:

```
C1 = PI * RAD * RAD + 2
VOL = PI * RAD * RAD * L
```

Sooner or later you're going to get tired of typing PI * RAD * RAD; so what can you do about it? Well you *could* use a subroutine:

```
100 GOSUB 1000
110 C1 = I + 2
120 GOSUB 1000
130 VOL = I * L
...
1000 I = PI * RAD * RAD
1010 RETURN
```

But now what happens if we have two more circles, of radius R1 and R2? Do we write two more subroutines?

```
1100 I = PI * R1 * R1
1110 RETURN
```

... and:

```
1200 I = PI * R2 * R2
1210 RETURN
```

And what do we do with this equation?

```
AT = (PI * RAD * RAD) + (PI * R1 * R1) + (PI * R2 * R2)
```

Of course, it *can* be done with subroutines; it can even be left just as it is – it *will* work, after all. But there are many more complicated equations than this that you might use.

We really need some kind of solution which has the same advantages as a subroutine, namely that the code only has to be written once – which saves memory, and makes it easy to change *every* use of the code by changing the subroutine. And we'd want it without the disadvantage that subroutines do not fit well into equations, as we have seen.

Enter DEF

This is where the DEF FN statement comes in. We can rewrite that horrible equation for AT like this:

```
AT = FNA (RAD) + FNA (R1) + FNA (R2)
```

You can use that variable now whenever you want – and it's a vast improvement on a subroutine system, to be sure. So how does it work?

We are looking at 'user-defined functions'; so before we users can use the functions, of course we have to define them! Sticking to our example, let's define a function to calculate our area:

```
10 DEF FNA (I) = PI * I * I
```

What does this statement mean? It starts with DEF FN, short for 'DEFine FuNction'. The 'A' is the function name and it follows the same rules as variable names: so you can have several functions with names such as FNW and FNTR. The variable 'I' is called the *dummy* variable, and that will be explained in detail shortly. To the right of the assignment operator is the equation which defines the function and will be executed whenever you subsequently use that function name.

The power of the user-defined function lies in the dummy variable (although I have used 'I' here, any variable name *could* be used). It is important to realise that this 'I' is not the same as any 'I' used in the program. When we use the function, like this for example...

```
A = FNA (RAD)
```

... the value of RAD is used wherever 'I' appears in the function definition. This process is called the substitution of an *actual parameter* (RAD) for a *dummy parameter* (I). So if we say:

```
A = FNA (RAD)
```

... the equation becomes:

```
A = PI * RAD * RAD
```

If we say:

```
A = FNA (R1)
```

... the equation becomes

```
A = PI * R1 * R1
```

We can even use an expression as the argument of the FNA function:

```
A = FNA (2*RAD+1)
```

... which gives the equation:

```
A = PI * (2*RAD+1) * (2*RAD+1)
```

So you can see that a user-defined function would be employed in equations in the same way as built-in functions like SIN or TAN. But instead of the definition of the function being fixed, as with those trigonometrical functions, we ourselves decide what the function is to do.

We have now shown that the user-defined function does in fact give us the advantages we asked of it: that the code (the function definition) is only written once, so we can change every use of a function just by changing the definition once. In addition, being a function it fits quite neatly into equations.

But you can only have *one* dummy variable (such as the 'I' in those examples). Any other variable mentioned in the function definition (such as PI) is a *real* variable, and it will have the value it has in the program when the function is used (*not* when it is defined). For example:

```
10 K = 15
20 DEF FNC (W) = 10 * SIN (2 * W +K)
30 K = 0.1
40 PRINT FNC(0.5)
```

When FNC is evaluated in line 40, 0.5 is substituted for 'W' in the function definition in line 20. K is a real variable, of course, but it has the value 0.1 and *not* the value 15. Line 40 has the same effect as:

```
PRINT 10 * SIN (1.1)
```

The second restriction is that you can only define numeric functions: the value returned by the function must be a number, not a string. You cannot, for instance, say:

```
10 DEF FNA$(I) = MID$ (A$,I,1)
```

Apart from these two drawbacks the user-defined function is a very powerful tool, and deserves to be used much more often than it is. ■

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compunet

a nice place to visit?

Being the continuing story of a young (well, middle-aged) man's love affair with a modem...

by Karl Dallas

The story so far: our hero has obtained a pre-production sample of the Commodore 64 modem. He has explored the farthest reaches of Prestel and Micronet until he's seeing square lo-res graphics in front of his eyes; he's tried (unsuccessfully) to access the American CompuServe Database in Ohio; and he's managed (with some difficulty) to pay his phone bill. Now read on...

The thinking behind the new Commodore 64 modem is delightfully simple, when you come to think of it: not only to sell a simple, comparatively inexpensive device which plugs straight into the phone lines and makes microcomputer/ telecommunications almost as easy as turning on a light switch, but also to establish a powerful new database that succeeds where Prestel and even Micronet have so far failed.

In short, the people at Commodore want to catch the imagination of your average micro hacker in a way that demonstrably hasn't happened yet.

The 'wired society' is a great concept when you read it on a Whitehall press release or hear it in the Prime Minister's speeches. But with members of the public not signing on fast enough to make being an Information Provider anything more than an expensive tax loss – and Prestel IPs are dropping out like the proverbial flies – it clearly needs some kind of shot in the arm before it becomes more than just a gleam in Margaret Thatcher's steel-blue eyes.

Commodore is planning to give it that shot. But, typically, Commodore is not doing it in an orthodox way.

Compunet is Commodore's sit-up-and-beg information service. It is expected to be available to all you people out there in computerland some time in September (if nothing goes seriously wrong between now and then). And it will ignore Prestel entirely.

It's a strictly go-it-alone service, which will stand or fall on how many people buy the £99.99 modem and become free (for the first year, at least) subscribers.

Teleshopping

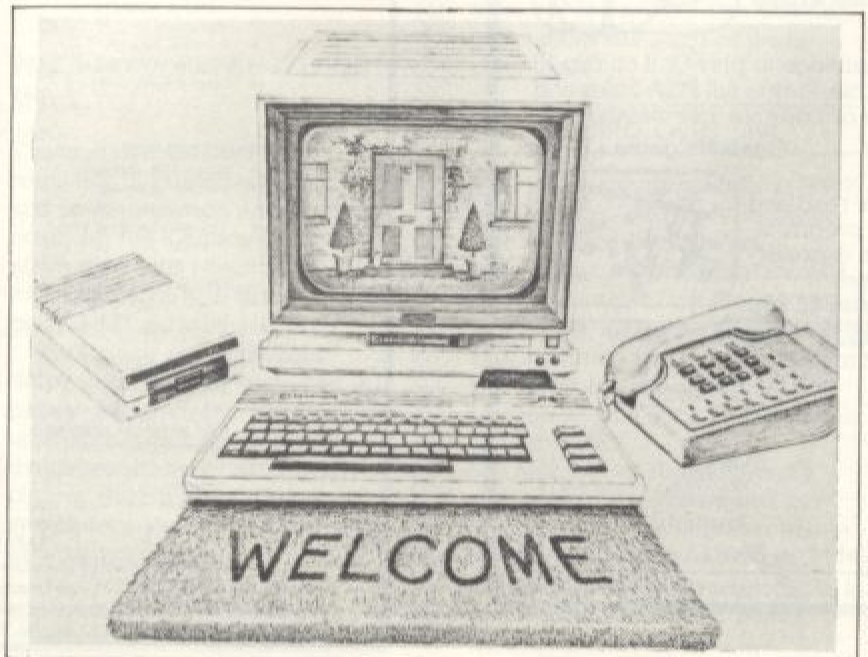
One of the main advantages of Prestel should be the fact that if you use it to do your teleshopping, then the costs of what you buy can be charged to your quarterly Prestel bill. In practice, many companies on Prestel ask you to send good old-fashioned paper stuff like cheques; at the very least they need you to quote a credit card number before they will do nicely for you. You can't even join ICPUG (the Independent Commodore Products Users' Group) electronically – though that's because ICPUG gets its pages free, and it isn't allowed to do serious business on the screen.

When you join Compunet, though, you also have to sign a direct debit authorisation. That allows them to bill you *at the bank* and to receive payment with no further action on your part: a little risky, if you're an impulse purchaser like me, but from Compunet's point of view it sure beats waiting 90 days for the money.

And, as evidence that they're aiming to take on both Prestel and Micronet at the same time, Compunet will be extending the service to owners of other micros besides Commodore: or so a little bird tells me, though I won't expect to see that before mid-1985.

On-line

A few lucky folk (including your humble servant) have been given privileged access here and now to see what a Good Thing Compunet is going to be.



Before I could get on to Compunet, I had to swap the Viewdata chip on my modem – which meant I won't be able to get Prestel again until they get round to writing the new disk-based Viewdata software. I was allocated a user number and password; and I had to promise faithfully not to go on about all the bits that don't quite work...

If you got shown round a half-finished building you wouldn't be horrified if the lifts don't work, and you might expect to find a lot of dust and builders' rubble around. So I wasn't at all amazed to find signs of work in progress all over as I browsed. But it's sure going tp be a nice place to visit when it's officially opened.

The first thing I liked was the fact that dialling was easier, especially if you don't get through first time. The command CONNECT (or SHIFT/C for short) produces a number prompt, after which you can type in one of the 12 telephone numbers that will reach the computer nearest to you. In my case this was 01-637 1422, since I'm in London (there's a second London computer port in case that one gets too busy). The others are in Andover, Birmingham, Bristol, Edinburgh, Glasgow, Leeds, Luton, Newcastle (upon Tyne, I assume, though the documentation doesn't say), Leicester, and Warrington.

If you can't get through, the computer remembers the last number you've dialled; it will try again if you press RETURN – and it'll continue to do so until you switch off, as a matter of fact.

Modem memory

Then comes one of the nice parts. Compunet takes about 13K

of memory at your end. There's 8K in the Compunet modem; the other 5K comes from the host computer, which quizzes your 64 to see if it has the full 13K and downloads the extra code if you haven't got it on board. You can then save this to disk (with the special command CNSAVE). So next time you can LOAD it directly (the command is CNLOAD, as I expect you guessed) before getting on line to the host computer – thus saving phone time and money.

If the 5K bit has been updated since you last dialled in, the host computer checks its latest version with what you've got in memory; and if yours is a bit old-hat it's updated automatically. That'll make continual enhancement a really valuable feature, with absolutely no hassle to you or me.

The next thing I liked was what the people at Compunet call the 'duckshoot' menu, a list of possible commands along the bottom of the screen. The original idea was to have these moving slowly across, past a highlighted window; you'd have about two seconds to hit RETURN and get the option you wanted. They decided this was a bit chancey, so now the menu runs to left or right past the window when you press the left and right cursors – a sort of continuous loop, so that as a command goes off one side of the screen it re-emerges on the other.

One of the commands is 'Help'. Much of the 5K extra memory is taken up by very comprehensive help screens at every level of menu; those are downloaded with the system software.

You can get a duckshoot menu even without logging on, if you type 'EDIT' (or SHIFT/E) from the opening screen, because you can edit messages off-line or on-line.

In the jungle

Uploading of members' screens (which may be software or just noticeboards) into what's called the 'Jungle' is one of Compunet's special features. An average charge of 1p per kilobyte or per frame per day will be made, with a minimum charge of 5p, and you'll be able to charge people who download your software. At the moment, this is little more than a couple of rather nice graphics screens (I like the logo especially) – hardly surprising since the service isn't even public yet.

There's also 'Software Park' for downloading commercial software (including the Vicsoft range), and 'Mailbox' for sending and receiving electronic mail.

Having accessed America's CompServe more successfully since my last report, I must say that Compunet is a much more friendly service. The American is much more professional-looking, with pages of info scrolling rapidly up the screen at you; but that makes it rather forbidding as well. The biggest plus for the Americans is the standard of technical questions and answers you can eavesdrop on, which is several cuts above the "why do I get those funny characters when I press a cursor after a quotes sign?" queries you get in so many British mags. But Compunet promises to be a lot more friendly.

Anything I didn't like? Well, it was my impression that getting screens up was a little slower than on Prestel. But if the entire product lives up to the promise of the sample I've observed so far, it'll very quickly become a force to be reckoned with in the micro world.

PEEKs and POKEs with AND and/or OR:

The basics of Bit Switching

by J Cundell

The Commodore 64 is exceptional value with its excellent keyboard, stacks of memory, the best sound chip in the business, sprite graphics and extremely flexible operating system. Or rather, it *is* good value – if you are capable of keying in the incredible amount of POKEs and PEEKs required to access most of the goodies that this best selling machine has to offer. But the problems don't stop there: enter the wonderful world of Bit Switching to make the most of those PEEKs and POKEs.

The handbook which accompanies the machine is dreadfully inadequate. So if you intend to do more than play games or run other people's programs, it will not be long before you start hunting the shelves of your local computer dealer for more practical information.

The *Programmer's Reference Guide* will no doubt be your first port of call. This certainly contains all the information that you need to become a proficient programmer; but it assumes a more than average knowledge of Basic. Other books have therefore hastily filled the gap – one or two are excellent, some average, quite a few considerably worse than useless.

With perseverence and some hours at the keyboard, however, you can reach the stage where your programs can become useful and worthy of exposure to others – especially for textual software.

But as soon as hi-res, graphics and sound are attempted, things become horribly complicated. You could resort to Simon's Basic or one of the many graphic aids now available; the disadvantage with these utilities is that immediately they reduce markedly the acceptance of your software to only those other users who have that specific package. Otherwise, you must be able to use the dreadful Basic 2 commands with confidence.

Most of the commands are adequately explained in the literature and with patience their application will be understood. I have struggled with this problem for nearly six months now and the light is beginning to shine through. I managed to clarify most of my difficulties by diligent investigation and good old-fashioned key-bashing.

My biggest problem was trying to find out what was meant by something like ...



POKE 53265, PEEK(53265)AND 191

... or ...

POKE 53270, PEEK(53270)OR 16

These statements are used regularly in published programs and in the manuals and books covering the Commodore 64, but nowhere could I find an explanation of how the commands actually *worked*.

Only since my decision to delve into machine code has the penny dropped; but had I known what was happening before, things would have been much clearer during my attempts to switch locations in and out on the 64's memory map.

For that is what the two statements are all about: *bit switching*. And if you wish to gain full benefit from the exceptional flexibility of the 64 then it is imperative that you fully understand the logic of these commands.

A little byte first

Your 64 consists basically (sorry) of over 64,000 memory locations that are used by software – which is either pre-programmed into the computer in the form of Read Only Memory (ROM): or it's code that you enter through the keyboard or from some outside storage source such as tape, disk or cartridge.

A number of these memory addresses or registers are put aside by the manufacturer to have special functions – for instance, to switch on or off sound channels, video banks, input/output devices.

One of the major advantages of the 64 is that these locations can be manipulated and different functions accessed by the programmer. Before we look at how to carry out these operations, though, it will be necessary to take a look at how the memory addresses are built up. Any one address or location consists of one byte, and as most of you will know a byte can store numerical values. It does this by switching on and off its bit positions – each byte consists of eight bits or switches, and each one of these bits represents one binary digit.

Now, there is not room here to discuss binary nomenclature in detail; such information is available in any introductory textbook on computer programming. But in short, binary is a number system which uses only two digits, 1 and 0; and any number can be represented in binary. Inside the computer byte, the binary numbers are represented by pulses of electricity with a pulse for 1 and no pulse for 0. A bit can therefore be on or off, 1 or 0. Hence, any byte's value can be represented by the eight switches. For example, binary 00010001 represents 17 in decimal. (As this system only uses two numbers, 0 and 1, it is known as binary. Of course, our normal numbering system is based on 10 numbers, 0 to 9, and is therefore known as decimal.)

The location of the number counting from the right-hand side provides the power of 10 by which each digit is to be

multiplied. Let us take an example, decimal 1224:

1	2	2	4	*decimal*
3	2	1	0	*location*

$1*10^3 + 2*10^2 + 2*10^1 + 4*10^0$
= 1224 *power 10*

... or to put it another way:

1000 + 200 + 20 + 4 = 1224

The result of a binary computation is determined in exactly the same manner except that the location of the digit counting from the right hand side determines the power of 2 by which each number is to be multiplied. Let's take a look at a binary number and examine how it breaks down into decimal:-

1	1	0	1	0	1	1	0	*binary*
7	6	5	4	3	2	1	0	*location*

$1*2^7 + 1*2^6 + 1*2^5 + 1*2^4 + 1*2^3 + 1*2^2 + 1*2^1 + 1*2^0$
= 214 *power 2*
128 + 64 + 0 + 16 + 4 + 2 + 0 = 214 result

Switching

If the above makes sense to you, we're now in a position to return to the original discussion of switching these various bits within bytes.

Why should we do this? Well, each of these individual bits within a byte actually acts as a switch in its own right: and various combinations switch on or off the special functions previously mentioned.

For instance, take a look at address 53272. The upper four bits of this address control the location of the screen memory, which can be moved to anyone of 15 different locations plus the one that is automatically defaults to on powering up the 64.

If that is not complicated enough, bits 1, 2 and 3 control the location of the character memory.

Bits are labelled from right to left in accordance with their numerical power as in the table, in other words 0 to 7. So to set bit 4 of an address to 1 – that is, to turn it on – you can POKE the byte with decimal 16 (2 to the fourth power). This POKE clears the whole byte and replaces it with a 16, or in binary, 00010000.

The problem is that practically all of the system control bytes in the 64 carry out a variety of operations, as we have seen with 53272. And in many instances you will want to be able to switch on or off a specific bit *without affecting any of the other bits.* Obviously it will not be possible to do this by POKEing a single decimal number. But this can be done by using the OR and AND commands.

The OR command

This statement or keyword examines each individual bit of the original byte and compares it with the corresponding bit of the OR byte. If one or the other of the bits is on, that is a '1', the resulting byte will be given a 1 in that specific bit. If neither of the bits is on, the resulting specific bit will be a 0.

Therefore, if we wished to change bit 4 to a '1' without changing any of the other bit settings within a particular byte, we should POKE 53272, (PEEK(53272)OR16).

The AND command

AND behaves in a similar manner. It examines each individual bit of each byte and comapres it to the corresponding bit of the AND byte; this time it sets the bit on only if both the first bit and the second bit are 1's.

Let's take the original byte as 00011111 or decimal 31.

Original address	00011111 =	31
AND with 226	11100010 =	226
Resulting byte	00000010 +	2

So therefore ANDing 16 with 226 clears bit 0, 2, 3 and 4. This would be written as:

POKE 53272, (PEEK(53272) AND 226)

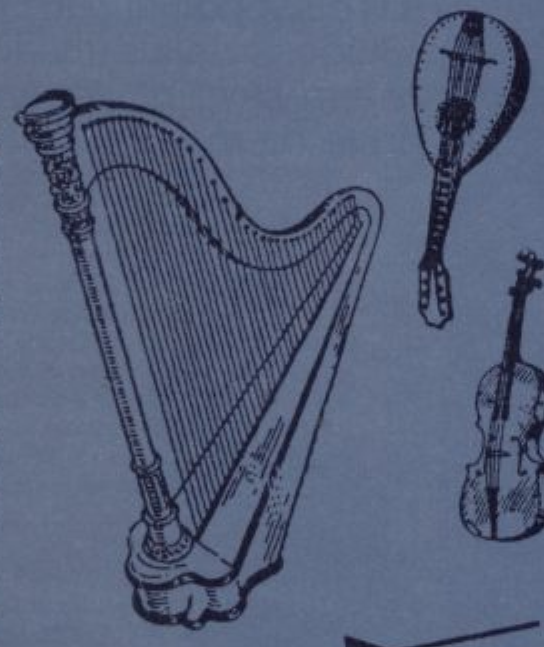
Armed with the means to carry out these operations you will find the Commodore 64 to be a very amenable and powerful machine.

Singalong-a-Summer

by Diego El Sid

Wherever you go on holiday this summer, whether you're riding the waves at Malibu, horseriding in the Sierra Nevada or just soaking in the sun at dear old Frinton, there's one tune that's guaranteed to put you in that sing-along holiday mood. We present it here in all its glory.

Lines 10 – 200 set up the Commodore 64's SID chip (using all three voices) and a routine for reading the data statements. So you could write your own tune by using this first half of the program as a base. Don't forget, you need line 2000 whatever data statements you provide of your own.







It is more fun when the camp is kept orderly and tidy

```
10 SID=54272
20 L1=SID:L2=SID+7:L3=SID+14
30 H1=SID+1:H2=SID+8:H3=SID+15
40 V1=SID+4:V2=SID+11:V3=SID+18
50 POKESID+24,15
60 POKESID+5,9:POKESID+6,0
70 POKESID+12,36:POKESID+13,36
80 POKESID+19,18:POKESID+20,170
90 T=TI
100 POKEV1,16:POKEV2,32:POKEV3,16
110 READK:IFK=0THEN190
120 READA1,B1,A2,B2,A3,B3
130 IFA1THENPOKEH1,A1:POKEL1,B1:POKEV1,17
140 IFA2THENPOKEH2,A2:POKEL2,B2:POKEV2,33
150 IFA3THENPOKEH3,A3:POKEL3,B3:POKEV3,17
160 K=INT(K/1.5):T=T+K
170 IFT>TITHEN170
180 GOTO100
190 FORN=L1TOSID+14:POKEN,0:NEXTN
200 END
500 DATA20,28,49,0,0,0,0
510 DATA20,29,223,0,0,0,0
520 DATA40,33,135,28,49,11,48
530 DATA40,33,135,28,49,8,97
540 DATA20,37,162,29,223,11,48
550 DATA20,42,62,0,0,0,0
560 DATA20,37,162,29,223,8,97
570 DATA20,33,135,0,0,0,0
580 DATA80,28,49,28,49,11,48
590 DATA40,0,0,33,135,0,0
600 DATA60,28,49,44,193,5,152
610 DATA40,28,49,37,162,7,12
620 DATA40,0,0,42,62,0,0
630 DATA40,0,0,33,135,7,119
640 DATA60,29,223,29,223,0,0
650 DATA20,0,0,33,135,0,0
660 DATA40,29,223,37,162,7,119
670 DATA20,29,223,37,162,0,0
680 DATA20,29,223,37,162,0,0
690 DATA20,33,135,42,62,0,0
700 DATA20,0,0,44,193,0,0
710 DATA20,33,135,42,62,0,0
720 DATA20,37,162,37,162,0,0
730 DATA60,29,223,29,223,7,119
740 DATA40,28,49,33,135,0,0
750 DATA60,29,223,42,62,8,97
760 DATA40,44,193,44,193,10,143
770 DATA40,42,62,42,62,0,0
780 DATA40,37,162,29,223,11,48
790 DATA60,33,135,28,49,0,0
800 DATA20,28,49,0,0,0,0
810 DATA20,29,223,0,0,0,0
820 DATA40,33,135,28,49,11,48
830 DATA40,33,135,28,49,8,97
840 DATA20,37,162,29,223,11,48
850 DATA20,42,62,0,0,0,0
860 DATA20,37,162,29,223,8,97
870 DATA20,33,135,0,0,0,0
880 DATA80,28,49,28,49,11,48
890 DATA40,0,0,33,135,0,0
900 DATA60,28,49,44,193,5,152
910 DATA40,28,49,37,162,7,12
920 DATA40,0,0,42,62,0,0
930 DATA40,0,0,33,135,7,119
940 DATA60,29,223,29,223,0,0
950 DATA20,0,0,33,135,0,0
960 DATA40,29,223,37,162,7,119
970 DATA20,29,223,37,162,0,0
980 DATA20,29,223,37,162,0,0
990 DATA20,33,135,42,62,0,0
1000 DATA20,0,0,44,193,0,0
1010 DATA20,33,135,42,62,0,0
1020 DATA20,37,162,37,162,0,0
1030 DATA60,29,223,29,223,7,119
1040 DATA40,33,135,33,135,4,48
1050 DATA40,33,135,33,135,4,48
1060 DATA40,29,223,29,223,4,180
1070 DATA40,26,156,26,156,4,251
1080 DATA40,25,30,25,30,5,71
1090 DATA80,22,96,22,96,5,152
2000 DATA0

READY.
```

Using the 64's

The Commodore 64 User Manual briefly mentions the four function keys on the right hand side of the keyboard, suggesting that they can be defined in many ways to handle repetitive tasks. After this encouraging news it is disappointing to find no further reference to them. Even the programmers' Reference Guide is uninformative on the matter.

The fact is that the keys are merely spares and have no set functions at all ... unless the user is prepared to write a program to drive them.



The program described here will do just that. It enables you to define a statement for each key, which will be printed on the screen whenever that key is pressed. The purpose is to save the effort of typing in frequently used expressions such as ...

POKE 53281, (PEEK(53281) +1) AND 15 [RETURN] and **PRINT FRE(0) − (FRE(0) < 0)*65536 [RETURN].**

Now, a job like this is simple in Basic: we just instruct the computer to expect a key entry, check if it is one of our function keys, and jump to a program line carrying the desired command. But this is of no use to us for editing purposes because it requires a program to be running continuously and awaiting a keyboard entry.

What is needed is a program that works while the Commodore is in direct mode; that means we must use the interrupt facility, and therefore we must employ machine code.

Interrupts

It will be worthwhile to digress briefly to explain these 'interrupts' for the benefit of novice machine-code programmers. Sixty times a second the operating system leaves off from whatever task is being performed in order to carry out a few checks on the inputs and outputs – for example, scanning the keyboard to find out if a key is being pressed.

Although the routine which carries out this task is in ROM and cannot be changed, the address (or 'vector') is in RAM. A user interrupt simply changes this vector to point to a location of the user's own choosing; control is returned to the regular interrupt upon completion.

I wanted my Function Key Definition program to contain the following features:

- Entering of defined statements via the keyboard, with the opportunity to re-define as and when the need arises
- Editing of defined statements on entry
- Use of shift and quotes modes
- Execution of command statements automatically
- At least 40 characters per statement
- 'Portability' across memory space, to avoid clashing with the program being written

The first items are dealt with by taking advantage of the CHRIN routine at FFCF hex (65487 decimal). Since the keyboard goes 'dead' during user interrupts, this routine is best called by means of a SYS command in direct mode.

But continual use of SYS commands by hand can lead to problems if errors are made, so the program prints the SYS statement on the screen from

Function keys

by John Rampling

within the interrupt. It works like this:

- ☐ **Function key pressed** (or SHIFT +key): the previously defined statement is printed on the screen
- ☐ **Function key + CTRL key** (or CBM key to define a shifted key): the SYS command is printed on the screen to call the CHRIN routine.

The CTRL key enables definition of keys F1, F3, F5 and F7. The CBM key (or the CTRL + SHIFT keys) handle F2, F4, F6 and F8.

If you have already run the program before reading this far, you may be wondering why the SYS command does not appear on the screen. In fact it does appear briefly (for about 1/60 second) but is instantly overwritten by a message inviting input of a key definition.

Item 4 on my list of requirements is met by using the left-arrow symbol to represent Return. The program checks for this symbol and converts it to CHR$(13) whenever it is encountered (for that reason it can not be used as a graphics symbol in your key definitions).

The characters you want are typed in, up to a maximum of 64, and entered by pressing RETURN. Do not exceed 64 characters – the computer will suppose you have started afresh and ignore the first 64! It's easy enough to tell when you have reached the limit: the cursor will have reached the end of the second line of print on the screen.

The characters you want are then saved in the portion of memory reserved for the particular key, and finished off with a zero to mark the end. Depressing the appropriate key will thereafter print the characters by copying them from memory into the keyboard buffer, to be transferred to the screen on exit from the interrupt.

The problem ...

And here lies a problem. The keyboard buffer has room for only ten characters, and any attempt to put more into it will run the risk of corrupting important data in the bottom 1K of memory.

This can be overcome by copying the contents of memory into the buffer ten characters at a time, returning for the rest at the next interrupt when the keyboard buffer has been emptied. This involves setting a 'flag' to remind the program that characters are waiting in the queue.

To operate, load the Basic loader program and RUN it. You will be confronted by a menu of options to permit you to select the memory location in which you want the program to reside. Unless you are using the program to assist you in writing machine code programs, I would recommend Option 1 which places the routine at the top of the 4K RAM buffer where it is out of the reach of Basic.

When RUN, the program deletes itself to leave a clear area for your new program. The machine code routine remains, occupying 3 to 4K of memory starting at the location you have picked.

The loader

The Basic loader is fairly self-explanatory. The main business is carried on in lines 200 to 280 in which the DATA is POKEd into the memory location chosen, and a section of memory is set apart if it is decided to use part of the Basic program space below 40960. By all means experiment by changing the variable A to allow use of other locations as desired.

The assembly language version is shown for the interest of machine-code fans. The values assume a starting location for the program at C200 hex. But the vital JMP statements are liable to be altered in the Basic version if a different starting place has been picked; so don't be alarmed if a disassembly of the finished program is not identical.

One final point of importance. When the interrupt vector has been changed in the manner described earlier, there is a likelihood of things going wrong when you try to use the cassette player to load or save programs. To avoid problems, always press the RUN/STOP and RESTORE keys before using the cassette player. Alternatively, and less drastically, restore normal interrupts by entering ...

POKE 788, 49: POKE 789, 234: SYS 679

and re-enable your Function Key program afterwards with ...

POKE 788, 0: POKE 789, A+2: SYS 679

... where A has the same value as the variable A in the Basic program.

Ok, let's try it ... ■

Assembly language listing

```
20 ORG $02A7
30 ; SYS 679 ENABLES
   INTERRUPT
40 SEI
50 LDA #0
60 STA $0314
70 LDA $02
80 STA $0315
90 CLI
100 RTS
110 ; PRINT SYS 717 (RETURN)
120 SYS BYT 13, 83, 89, 83, 55,
    49, 55, 13
130 ; PRINT 'DEFINE KEY F1
    &C.'
140 INVITE BYT 145, 68, 69, 70,
    73, 78, 69, 32, 75, 69, 89, 32, 70
150 KEYNUM BYT 0, 58, 32
160 SAVE BYT 0
170 ; SYS 717 STARTS HERE
180 LDX #0
190 INVPRT LDA INVITE,X
200 JSR $FFD2
210 INX
220 CPX #16
230 BNE INVPRT
240 LDX #0
250 NEXTIN JFR $FFCF
260 CMP #13
270 BNE DEFLOC
280 LDA #0
290 DEFLOC STA $C000,X
300 BEQ GOBOBO
310 INX
320 CPX #64
330 BNE NEXTIN
340 GOBOBO RTS
350 ; KEY DETECTION
    ROUTINE
360 ORG $C200
370 LDX SAVE       ; CHECK IF
    CHARACTERS WAITING IN
    QUEUE
380 BEQ KEYDET
390 JMP CONTIN
400 KEYDET LDA $C5
410 CMP #64
420 BNE KEY1
430 NOLUCK JMP $EA31
440 ; CHECK KEY NO. F1 &C
450 CMP #4
460 BNE KEY3
470 LDX #0
480 LDY #$31
490 BNE WOTFUN
500 KEY3 CMP #5
510 BNE KEY5
520 LDX #$40
530 LDY #$33
540 BNE WOTFUN
550 KEY5 CMP #6
560 BNE KEY7
570 LDX #$80
580 LDY #$35
590 BNE WOTFUN
600 KEY7 CMP #3
610 BNE NOLUCK
620 LDX #$C0
630 LDY #$37
640 ; TEST FOR SHIFT, CTRL &
    CBM KEYS
650 WOTFUN LDA $028D
660 BNE SHFKEY
670 LDA $0315
680 SEC
690 SBC #2
700 BNE KEYPRT
710 SHFKEY CMP #1
720 BNE CTRLKY
730 LDA $0315
740 SEC
750 SBC #1
760 BNE KEYPRT
770 CTRLKY CMP #4
780 BNE CBMKEY
790 LDA $0315
800 SEC
810 SBC #2
820 BNE KEYDEF
830 CBMKEY CMP #2
840 BEQ CRRYON
850 CMP #5
860 BNE NOLUCK
870 CRRYON LDA $0315
880 SEC
890 SBC #1
900 INY
910 ; SET POINTERS FOR KEY
    DEFINITION INPUT
920 STX DEFLOC +1
930 STA DEFLOC +2
940 STY KEYNUM
950 LDX #0
960 SYSPRT LDA SYS,X
970 STA $0277,X
980 INX
990 CPX #8
1000 BNE SYSPRT
1010 STX $C6
1020 DELAY LDX #$FF
1030 XLOOP LDY #$FF
1040 YLOOP DEY
1050 BNE YLOOP
1060 DEX
1070 BNE XLOOP
1080 EXIT JMP $EA31
1090 ; PRINT KEY DEFINITION
1100 KEYPRT STX PRTLOC +1
1110 STA PRTLOC +2
1120 LDX #0
1130 CONTIN LDY $C6
1140 BNE EXIT
1150 LDY #0
1160 PRTLOC LDA $C000,X
1170 BEQ MEMEND
1180 CMP #95
1190 BNE NOTRTN
1200 LDA #13
1210 NOTRTN STA $0277,X
1220 INX
1230 INY
1240 CPX #64
1250 BEQ MEMEND
1260 CPY #10
1270 BNE PRTLOC
1280 STX SAVE
1290 BNE PRTEND
1300 MEMEND LDX #0
1310 STX SAVE
1320 PRTEND STY $C6
1330 BPL DELAY
```

A selective renumber Vic, 64 or Pet Toolkit

by M C Hart

One of the most useful features of any 'Programmer's Aid' or 'Toolkit' is the ability automatically to renumber the lines of a Basic program including all the GOTOs and GOSUBs. After a while, however, the initial delight fades when you realise that the whole of a program is usually renumbered by these functions. This means that if you have constructed your program with easily identifiable subroutines, they can become 'buried' after the renumbering process.

Some toolkits (but only a minority) do have a 'selective' renumbering routine that allows you to specify four parameters – start address, increment, from line number, to line number. But in the absence of a selective renumberer you may find that you are reluctant to use the renumber routine within your toolkit; and you may even renumber by hand if it is crucial to keep your sub-routines clear and intact at recognised locations.

To cope with this problem, here's a machine-code routine which is designed to be used in conjunction with your own toolkit. Essentially it is very simple in operation – it works by 'fooling' the CBM machine into thinking that the program starts at the line you specify and ends at the line before you specify. You can then renumber this portion of the program and finally call another routine which 'stitches' the program back together again.

The routine is quite short (70 bytes) but can be adapted for almost any CBM machine. Although it was written on a Commodore 64 it is presented here in a form suitable for Basic 4 as I imagine that that is the machine with the largest number of Toolkits installed; versions are also given for Basic 2 and the Vic-20, though it has not been tested on those.

The listings are:

- **RENUM.BASIC4** in which a full disassembly is given together with the ROM calls for other versions of Basic (Basic 4 by default)
- **RENUMBER-LOADER** in case you would like to load the routine directly into your machine. The DATA statements give the code in hex and it is converted into a decimal value before being POKEd into the second (or only!) cassette buffer starting at 828 ($033C)

Again this is written for Basic 4; but the REMs in the DATA statements detail the code that is required for basic 2, the Vic and the 64.

The code is relocatable: but you will have to work out the absolute call for the subroutine which is 47 bytes (+$2F) bytes further on than the start address – this routine is called twice (in lines 300 and 370) of the RENUMBER-LOADER listing.

One of the reasons why the routine is so compact is because extensive use is made of ROM

detailed in the disassembly (*Listing 1: RENUM.BASIC4*) for those who like to see how such ROM calls work. The references to the lines are the line numbers of the source code which are numbered from 100-650.

Line 330: Calls a sub-routine (VALUES) which checks that the next character is a comma, inputs and evaluates the number/expression and then converts FPAC#1 into a two-byte integer stored in LINELO and LINEHI. Basic is then searched for this line number; and if it exists, PTR1 and PTR2 point to it. If it doesn't exist (carry flag is clear, not set) then it is assumed that you wish a renumber to the 'genuine' end of the program and a zero byte is placed in STORE.

Lines 340-390: the values placed by the preceding subroutines into PTR1 and PTR2 are now fed into STRTLO and STRTHI which represents the pointers to the start-of-Basic. A constant value is fed into STORE representing the high byte of the link of the first 'true' line: this will be 04 for Basic 2 and Basic 4, 08 for the 64, 16 for the unexpanded Vic

Lines Lines 400-460: the VALUES subroutine is called again and two zero bytes are placed into the link bytes of the line specified. The zero byte at the end of the preceding line together with the two zero bytes just inserted fool

Endpiece

The second cassette buffer is used as a location only because it is fairly consistent across the entire range of CBM machines (and this is why the routine starts at 828 - $033C). If you wish to relocate, remember that the VALUES subroutine is located 47 bytes on from the beginning and the 'stitch' call after renumbering is 28 bytes on from the beginning.

I am sure that most readers will find something of interest in the operation of this renumbering routine – such as finding out how to feed parameters to a machine-code routine without using USR calls.

Listing 1: RENUMBER LOADER

```
100 REM RENUMBER-LOADER
110 REM
120 REM BY M.C.HART
130 REM
140 REM BASIC IV VERSION BY DEFAULT
150 REM
160 REM ALTERNATIVES IN REM STATEMENTS
170 REM ARE : BASIC2/VIC-20/C-64
180 REM
190 C=0
200 READ X$:IF X$="*"THEN1000
210 X=0:FORJ=1TO2:L=ASC(X$):L=L-48+(L>64)*7:X$=MID$(X$,2):X=16*X+L:NEXT
220 POKE 828+C,X:C=C+1:GOTO200
230 REM
300 DATA 20,6B,03
310 DATA A5,5C:REM A5,5C/A5,5F/A5,5F
320 DATA 85,28:REM 85,28/35,2B/85,2B
330 DATA A5,5D:REM A5,5D/A5,60/A5,60
340 DATA 85,29:REM 85,29/85,2C/85,2C
350 DATA A9,04:REM A9,04/A9,10/A9,08
360 DATA 85,02
370 DATA 20,6B,03
380 DATA A0,01,A9,00
390 DATA 91,5C:REM 91,5C/91,5F/91,5F
400 DATA 88
410 DATA 91,5C:REM 91,5C/91,5F/91,5F
420 DATA 60
430 DATA 20,B6,B4:REM 20,42,C4/20,33,C5/20,33,A5
440 DATA A0,01,A5,02
450 DATA 91,1F:REM 91,1F/91,22/91,22
460 DATA 84,28:REM 84,28/84,2B/84,2B
470 DATA A9,04:REM A9,04/A9,10/A9,08
480 DATA 85,29:REM 85,29/85,2C/85,2C
490 DATA 20,B6,B4:REM 20,42,C4/20,33,C5/20,33,A5
500 DATA 60
510 DATA 20,F5,BE:REM 20,F8,CD/20,FD,CE/20,FD,AE
520 DATA 20,84,BD:REM 20,8B,CC/20,8A,CD/20,8A,AD
530 DATA 20,2D,C9:REM 20,D2,D6/20,F7,D7/20,F7,B7
540 DATA 84,11:REM 84,11/84,14/84,14
550 DATA 85,12:REM 85,12/85,15/85,15
560 DATA 20,A3,B5:REM 20,2C,C5/20,13,C6/20,13,A6
570 DATA B0,04,A9,00,85,02,60
580 DATA *
1000 PRINT:PRINT"--ENTERED--":END
READY.
```

routine is so compact is because extensive use is made of ROM

preceding line together with the two zero bytes just inserted fool

```
READY.
```

routines (five) and zero-page pointers (four pairs): this also explains why so many changes are necessary when one converts from one machine to another.

To use the routine, type this in direct mode: **SYS 828,A,B**, where **A** is the first line to be selectively renumbered and **B** is the line immediately after the last line that you wished to be renumbered (so if you wished to number lines from 1000-1999 and a special subroutine was sitting at line 2000 then you would type SYS 828,1000,2000).

The routine 'looks' for the locations in RAM specified by the line numbers in the SYS call. The start-of-Basic is then made equivalent to the first line; the end-of-Basic is simulated by POKEing zeros into the link pointers of the second line specified.

At this stage, if you list your program you should see just the portion that you have specified. You can then renumber this particular portion using your own Toolkit renumbering routine. Finally, type: **SYS 856**, and the whole of the routine is 'stitched' back together again. If you make a mistake with the first value and the line number does not actually exist, the routine will start with the next available line number if possible. If the initial value supplied is larger than the value of the last line number you will have apparently wiped out your program if you attempt to list it; but you can resurrect it by typing **SYS 856**.

If you specify a second value which is deliberately larger than your last line, the routine will recognise that you intend to renumber until the end of the program and will act accordingly. So if you wished to renumber the whole of the subroutine at the end of a program which ran from 60000-60999 you could type **SYS 828,60000,61000** followed by your Toolkit's own Renumber and SYS 856; and the routine will then renumber from 60000 to the end of the program.

An important caution: if you have lines in the section you wish to renumber that make references to lines outside the range, your Toolkit Renumber routine will act as though these are references to non-existant lines. Some Renumbers leave them alone, others number them as 63999 or 65535. You will need to know how your own Toolkit responds and be prepared to renumber these references manually.

RENUM explained

Here is a detailed explanation of the workings of the routine as

the computer into thinking that this point is now the end-of-Basic. Return is now made to direct mode.

Lines 470-550: in order to start the 'stitching' process, a ROM routine is called which rechains the lines. This is not strictly necessary, but it has the fortunate by-product of leaving the end-of-Basic in two bytes – the zero page pointers named PRGEND. (The end-of-Basic may have been moved up or down in memory if the renumbering routine changed references to lines within the section that had the effect of making a line longer or shorter.) The value of STORE is then placed in the high byte of the 'link pointer' (over-written to simulate an end-of-Basic): if this is a 'true' end-of-Basic, STORE will contain a value of 0. A value of 1 is then placed in the low byte of the start-of-Basic pointer whilst CONST (a value of 04 for Basic 2 or 4; 08 for the 64; 16 for the unexpanded Vic) is placed in the high byte of the start-of-Basic pointer. Now the start-of-Basic is as it should be; and if the 'simulated' end-of-Basic is not the same as a 'true' end-of-Basic, a non-zero value has been placed in the high byte of the link pointer of the first line after the renumbered section. The correct links are then recalculated and inserted by calling the ROM routine LNKPRG and the routine exits to direct mode.

A note for Vic-20 users

On most CBM machines the start-of-Basic is always in the same place. But with the Vic-20 it moves around as memory is expanded. This can make life a little awkward at times, particularly such as these! This is where memory starts on various memory configurations:

Unexpanded Vic	4096
(location 44 – 16 – $10)	
Vic + 3K	1024
(location 44 – 04 – $04)	
Vic + 8K +	4608
(location 44 – 18 – $12)	

The values given in this article are for an unexpanded vic. If you have any expanded version of the Vic, change the RENUMBER-LOADER program so that **lines 350,470** feed in the hex value which is equivalent to your own start-of-Basic configuration:

Unexpanded Vic (as given in the REM statement)	**A9,10**
Vic + 3K	**A9,04**
Vic + 8K +	**A9,12**

Listing 2: RENUM.BASIC4

```
1000             100         ;RENUM.BASIC4
1000             110         ;
1000             120         ;SYS828 BEFORE RENUMBERING
1000             130         ;
1000             140         ;SYS856  AFTER RENUMBERING
1000             150         ;
033C             160         *=$033C
033C             170         ;
005C             180 PTR1    =$5C    ;B2=$5C VIC=$5F C64=$5F
005D             190 PTR2    =$5D    ;B2=$5D VIC=$60 C64=$60
0028             200 STRTLO  =$28    ;B2=$28 VIC=$2B C64=$2B
0029             210 STRTHI  =$29    ;B2=$29 VIC=$2C C64=$2C
0002             220 STORE   =$02    ;B2=$02 VIC=$02 C64=$02
001F             230 PRGEND  =$1F    ;B2=$1F VIC=$22 C64=$22
B4B6             240 LNKPRG  =$B4B6  ;B2=$C442 VIC=$C533 C64=$A533
BEF5             250 CHKCOM  =$BEF5  ;B2=$CDF8 VIC=$CEFD C64=$AEFD
BD84             260 FRMNUM  =$BD84  ;B2=$CC8B VIC=$CD8A C64=$AD8A
C92D             270 GETADR  =$C92D  ;B2=$D6D2 VIC=$D7F7 C64=$B7F7
B5A3             280 FNDLIN  =$B5A3  ;B2=$C52C VIC=$C613 C64=$A613
0011             290 LINELO  =$11    ;B2=$11 VIC=$14 C64=$14
0012             300 LINEHI  =$12    ;B2=$12 VIC=$15 C64=$15
0004             310 CONST   =$04    ;B2=$04 VIC=$10 C64=$08
033C             320         ;
033C 20 6B 03    330         JSR VALUES
033F A5 5C       340         LDA PTR1
0341 85 28       350         STA STRTLO
0343 A5 5D       360         LDA PTR2
0345 85 29       370         STA STRTHI
0347 A9 04       380         LDA #CONST
0349 85 02       390         STA STORE
034B 20 6B 03    400         JSR VALUES
034E A0 01       410         LDY #$01
0350 A9 00       420         LDA #$00
0352 91 5C       430         STA (PTR1),Y
0354 88          440         DEY
0355 91 5C       450         STA (PTR1),Y
0357 60          460         RTS
0358 20 B6 B4    470 LINK    JSR LNKPRG
035B A0 01       480         LDY #$01
035D A5 02       490         LDA STORE
035F 91 1F       500         STA (PRGEND),Y
0361 84 28       510         STY STRTLO
0363 A9 04       520         LDA #CONST
0365 85 29       530         STA STRTHI
0367 20 B6 B4    540         JSR LNKPRG
036A 60          550         RTS
036B 20 F5 BE    560 VALUES  JSR CHKCOM
036E 20 84 BD    570         JSR FRMNUM
0371 20 2D C9    580         JSR GETADR
0374 84 11       590         STY LINELO
0376 85 12       600         STA LINEHI
0378 20 A3 B5    610         JSR FNDLIN
037B B0 04       620         BCS RETURN
037D A9 00       630         LDA #$00
037F 85 02       640         STA STORE
0381 60          650 RETURN  RTS
0382           65535         .END

LINES :57    SYMBOLS:17    ERRORS:0

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LINELO=0011  LINK  =0358  LNKPRG=B4B6  PRGEND=001F  PTR1  =005C  PTR2  =005D
RETURN=0381  STORE =0002  STRTHI=0029  STRTLO=0028  VALUES=036B
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Screen Scene

ASTRAL ZONE
Joystick only
Price £6.95

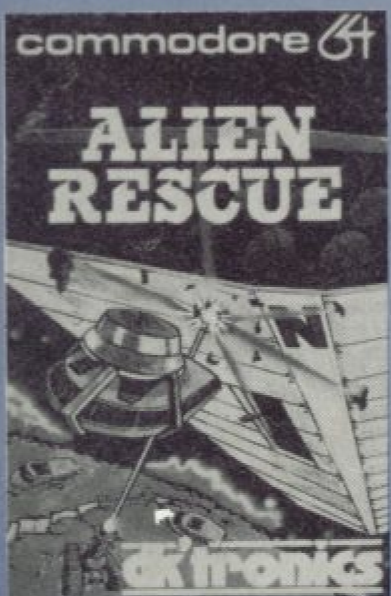
At first sight this game appears to have a lot to offer. It's a 3D battle game in the *Battle Zone* mode, in which the player flies around being attacked by beefy nasties – when one of them crosses your sights, zap!

The game continues like this, with the player amassing points for each kill, until a total of five nasties manage to hit you. Sound effects are okay, and there are two-player and high-score features.

If this were the first sheet in a multi-part game, it would be quite sufficient; however, the limited range of chunky attackers and the boring view of triangular mountains in the background won't hold your attention for long. Sorry, Channel 8, but this one gets a thumbs-down – it very quickly becomes monotonous. *DW*

Channel 8

Presentation:	■■■□□
Skill level:	■■□□□
Interest:	■□□□□
Value for money:	■■□□□



ALIEN RESCUE
Joystick only
Price £6.95

Now here's a funny thing: the illustration on the cassette liner card portrays *exactly* and *fully* what actually happens. Amazing!

You are required to ferry your fleet's survival rafts fleeing from their latest rout, taking them from the enemy planet back to the chunky multi-colour mother ship while studiously avoiding collisions with yet more capsules still falling from the sky. You are also cordially invited to exchange fire (with a very mobile cannon) provided you are not currently carrying cargo. Naturally the preceeding space battle was of mega proportions so you are consequently shouldered with an unremitting and interminable rescue mission ...

Not a complicated, convoluted video experience; merely a simple well-worn formula adequately implemented, allowing nine levels of difficulty. Run-of-the-mill background sonics with a blip for a successful grab. Extremely unlikely to hold you spellbound: but if you fancy something straightforward for a change, check out the insert. *LS*

DK'Tronics

Presentation:	■■■□□
Skill level:	■■□□□
Interest:	■■□□□
Value for money:	■■□□□

BATH TIME
Joystick only
Price £7.95

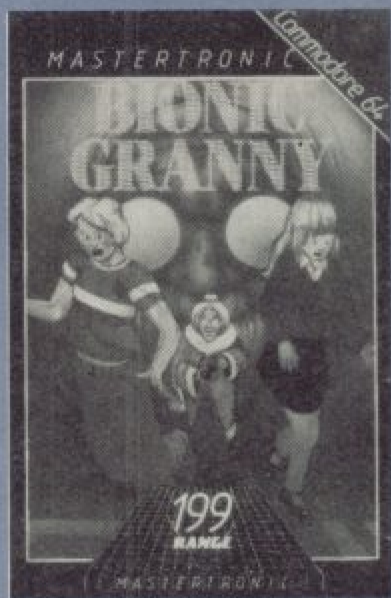
Described as a 'family' arcade game, this obviously misses the main market – especially as two joysticks are required and violence is eschewed. The game still offers a contest and friendly rivalry between players (the one player option should really be considered as a practice run).

The Trout Quintet (Schubert) and the Dying Swan by Tchaikovsky mellifluously complement the pastel colour scheme to produce a restful ambience. Perspective graphics are employed in depicting a square pool, containing a swan and a fish. If the water level rises high enough the swan swims away along a run-off: too low, and the fish perishes. One player turns on the selection of taps while the other opens the corresponding valves, trying to maintain an equilibrium. Complications arise when an elephant siphons off water or a boy with a pail pours some in.

That's it, apart from pre-selectable skill and speed levels. But graphics and sound are good: this program may well appeal to the more civilised amongst us. *LS*

PSS

Presentation:	■■■■□
Skill level:	■■■□□
Interest:	■■■□□
Value for money:	■■■□□



BIONIC GRANNY
Joystick or keyboard
Price £1.99

The trouble with bargain-basement games is that you're loathe to criticise them – you pays for what you gets, as they say. Given that caveat, this game is still pretty lousy. The scenario is rather perverse, too.

You're a granny, waiting to hit children with your "laser-powered brolly" as they come out of school. The only danger you must avoid is a lollipop person who throws his or her lollipop at you. The game is obviously designed for young children but that cannot excuse the dire lack of playability, the rudimentary graphics, and the careless grammatical mistakes in the on-screen instructions – aargh! *BB*

Mastertronic

Presentation:	■■□□□
Skill level:	■□□□□
Interest:	■□□□□
Value for money:	■■□□□



BLACK HAWK
Joystick only
Price £7.95

Imagine a birds-eye view of *Skramble* and you're part of the way towards visualising this game. Apparently there is some really sophisticated electronic hardware packed into a delta-winged bomber: as the onboard supremo you get to hog the computer's monitor – which either presents targets to bomb (attack mode) with rocket launcher and a moveable sight, or a refined depiction of avenging missiles, tanks, gunships and jets (defence mode) showing Black Hawk ready to spurt out cannon shells. If you let enemy craft slip off the edge of the screen while in attack mode, you are immediately switched to defence mode.

Accurate bouts of devastation are rewarded by enhanced weaponry and superior radar, which enables the detection of various enemy command posts. Eager beavers will no doubt seize the opportunity presented to smash their way through all eight levels.

Typical zap-and-dodge action (nowt wrong with that) with more than a veneer of refinement. There is a surge of interest with each new level as new targets and defence paraphenalia present themselves. Graphics are par for the course: the sonics are Wagner and Kapows.

If it was felt necessary to produce an eight-page instruction manual, why not put a page or two in the program? After all what happens when the dog chews it up and you can't recall what key works the smart bomb? *LS*

Creative Sparks

Presentation:	■■■□□
Skill level:	■■■□□
Interest:	■■■□□
Value for money:	■■■□□

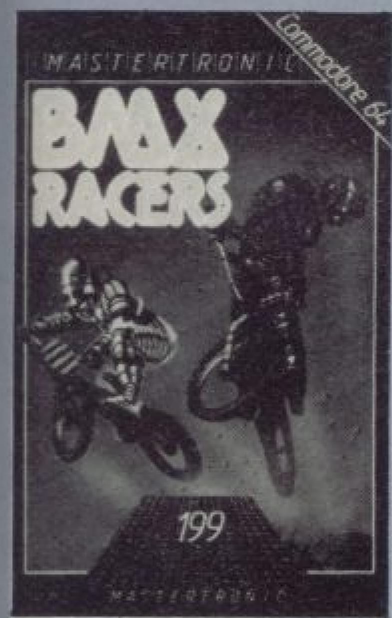
The 64 ought to be an excellent computer for games – and fortunately some suppliers are indeed taking advantage of that. Others aren't. Here's this month's crop of reviews.

How do we assess games? Basically we play them – which may sound obvious, except that all the reviewers have seen so *many* games that they can apply a bit of comparative experience to the evaluation.

We rate games out of five for each of four criteria. **Presentation** means how well the thing is packaged and how good it looks on the screen: dull graphics and poor sound get marked down here. **Skill level** refers to how much skill (of whatever kind) is required to play the game – so if pure chance is involved, the game gets a low mark. (But don't dismiss it on that: some 'chance' games are great fun.) **Interest** is an answer to how well the game did at maintaining the reviewer's interest in it. And **Value for Money** is obvious enough: it's our overall conclusion about how it compares with other games and whether we'd buy it ourselves.

BMX RACERS
Joystick or keyboard
Price £1.99

For the price, this is a surprisingly good and fairly original game. You're riding a motorbike through a park, trying to keep to the track whilst avoiding various hazards and another maniac biker who weaves in and out of the on-coming traffic, totally immune to disaster – just like going up the A1. Veer off the track and you're dodging



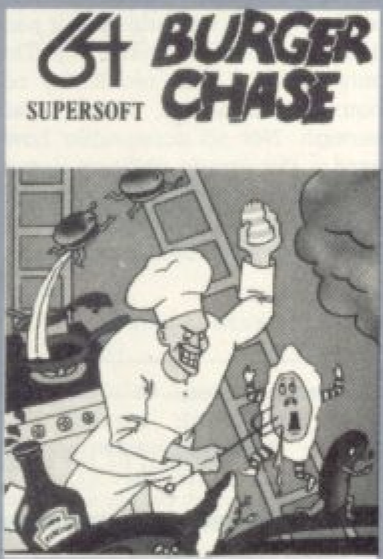
through trees and shrubs. That's it really – the points total mounts up the further you get.

Graphics are pretty rudimentary, though – the 64 is capable of much more. Your bike doesn't really look like one and, unless you read the blurb, you wouldn't guess that one of the hazards is a granny throwing a stick at your wheels. There are no engine revving sounds either, just a discordant tune – better turn the sound down. Despite all that, manoeuverability using a joystick is impressive. Definitely good value for a few hours.

BB

Mastertronic

Presentation:	■■□□□
Skill level:	■■■■□
Interest:	■■■□□
Value for money:	■■■■□



BURGER CHASE
Joystick or keyboard
Price £6.95

How on earth did they think of this one? Loosely based on the *Panic* formula, but nevertheless different and abstruse enough to warrant the epithet 'original'.

The constituent parts of four burgers (i.e. bun, meat and garnish) are stationed on different floors of a restaurant. The chef has to collate these by ascending ladders and trampling them down to the floor below, eventually to collect at the bottom: chain reactions may occur.

Once assembled – you're at the end of level one. But hang on: harassing the chef are (wait for it) sausages, fried eggs and pickles. With nothing but his innate agility and trusty pepperpot it's a close-run caper for our friend – especially as the stunning condiment is in short supply. Extra points can be achieved by squashing the wierdos and by grabbing the old faithful bonus objects.

Four different screens with good sound effects and a couple of ditties thrown in. Quirky enough to please anyone on the lookout for something different – and definitely not junk food.

LS

Supersoft

Presentation:	■■■■□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■■□

BOOGA-BOO
Joystick only
Price £7.95

Manoeuvre Booga-Boo the jumping flea to the top of the cavern, avoiding the flying dragon and the Venus fly-traps. You can jump to the left or to the right; the longer you keep the joystick in that direction the further you will jump.

The game sounds simple, but in fact it is very difficult to play: I couldn't escape once. The dragon seems to home in on you – and it is very partial to eating fleas. And the fly-traps are positioned so that if you don't judge the strength of a jump correctly you fall in.

The graphics on this game are wonderful; mushrooms, plants, ledges, everything is very well represented. The continual tune on the other hand is all right the first couple of games; but after that it gets annoying.

One gripe about this game is that it is preceded on the tape by a title-page program which serves no purpose whatever. Why couldn't the credits have been put in the insert? But if you want a lasting challenge and don't mind being frustrated as you bite the dust again, this game is for you. Otherwise, I suggest you can find easier and better games.

IC

Quicksilva

Presentation:	■■■■□
Skill level:	■■■□□
Interest:	■■■□□
Value for money:	■■■□□

CHINESE JUGGLER
Joystick only
Price £6.90

Your turn to be the Juggler! You must take plates from the plate-rack and set them spinning on the eight rods. As they show signs of flagging you must rush round to refresh them ... until finally you have got all eight on the rods, when you go on to the next screen.

On the first screen you can choose any colour plate, but on the second screen you are told the colour of the plate and you must find one of that colour. I didn't get past this!

The graphics on this game are good: the plates really spin, and your Oriental man is very well represented, complete with one of those Chinese hats. The sound is restricted to a continual tune, which might be quite good if it wasn't slightly off pitch (on my machine anyway).

Although it takes a while to get the hang of this game (perhaps the instructions could be better worded), I found it curiously compelling once I figured it out. Recommended.

IC

Ocean

Presentation:	■■■■□
Skill level:	■■■□□
Interest:	■■■■□
Value for money:	■■■■□

COSMIC BOUNCE
Joystick only
Price £7.50

Both the title and cassette illustration strongly imply a space game, but without the aid of a vivid imagination to most it would appear as a 'bouncing ball' derivative – a sophisticated super-version of the familiar 64 handbook example program.

The notion is good: a power source is shuttling (bouncing) back and forth between two bases and, yet again, aliens are out to claim it for their own. Defend it you must! Taking note of the two auxiliary rebound posts near the centre stage and the far corner springboards, you unleash a plasma bolt. Now, this projectile destroys everything in its wake (except of course the pins): so once an invader has been crushed the best policy is to recapture it before it zings all over the place and obliterates your 13amp socket. Different alien types engage your attention and the deflectors become mobile. Just to make things more interesting, the latter are show-stoppingly lethal to touch

– though you may use some of your nine lives in ramming the intruders.

Enjoyable to play; and you'll agree it is *different*. But how much better it *could* have been, say with really outrageous multi-colour nasties and a plausible space ship. The only sonics I can recall are rebounds and pulses, which is fair enough. Not so acceptable however is the erratic collision detection: several times I was penalised just for catching the plasma ball. There's a bug in there somewhere.
LS

Cable Software

Presentation:	■□□□□
Skill level:	■■■■□
Interest:	■■■□□
Value for money:	■□□□□

DEATH STAR
Joystick only
Price £5.99

This program utilises three-way scrolling and simulated shadows to give the impression of 3D rather successfully. *Star Wars* devotees are given the opportunity to play the leading role (no, not the princess!) (*why not – Ed*) and fly along the trench of the battle planet Death Star.

Nine levels of undiluted blast-or-be-blasted combat, featuring classically designed interceptors hurtling towards your large fighter. You may unleash only common-or-garden laser bolts. Beware of their unpredictable, unstoppable, pulsating missiles; and don't crash into the sides when taking violent evasive action. No way are they sitting ducks ... let's just say you have to be very nippy.

As the main colour scheme is black and grey, the TV controls will need to be set up just right. Nice graphics, though, and typical battle sonics but with scene-setting organ music on the title page. I suggest that you take a look at this little number at a micro shop near you.
LS

Rabbit

Presentation:	■■■■□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■■□



3D GLOOPER
Keyboard or joystick
Price £8.95

Essential equipment for mighty mean munchers, I should have thought. A fast-response 3D maze bespattered with blue tokens which you gobble up as you race round the streets: a few red ones too, with the power to turn the voracious brown Gloopers into a vulnerable orange. A sensor display indicating the proximity of tokens and monsters aid in the hunt for the 300 or so necessary to exit to the next level. As a 3D maze is more difficult to negotiate than the normal, it's just as well the grim galloping gourmets aren't too intelligent...

Plenty of pink brick walls, dead ends and long grey vistas of course. Padding feet, to warn of imminent danger, are the main sound effects. Certainly unusual but don't blame me if it makes you dizzy! *LS*

Supersoft

Presentation:	■■■■□
Skill level:	■■■□□
Interest:	■■■□□
Value for money:	■■■■□

ENCOUNTER
Joystick only
Price £9.95 tape, £12.95 disk

So you're getting pretty sick of arcade games? Bored with flying a spaceship through a barrage of nondescript nasties? You need a revitalising tonic. Playing *Encounter* may just provide that pick-me-up. It's a true three-dimensional combat game.

You use the joystick to move in any direction through a barren landscape scattered with huge black pylons – rather like a Salvador Dali painting. The screen is actually the window of your ship. Pylons loom large and recede into tiny specks as you move backwards and forwards or weave in

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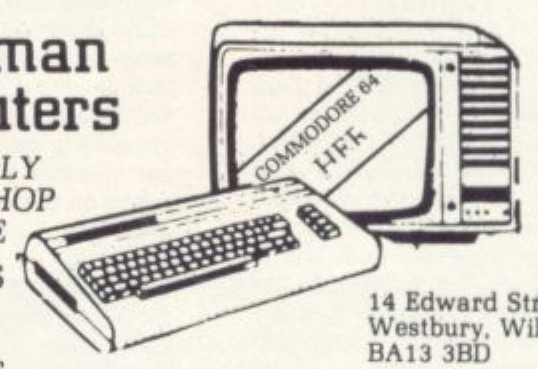
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and out of them.

But the idea behind the game is lamentably rather threadbare: you hunt out and destroy the flying saucers that roam around.

A radar scanner at the bottom of the screen helps you track them down. Needless to say, the saucers also fire at you. And missiles appear occasionally – although you don't know who or what fired them.

You can duck behind pylons but they won't guarantee you safety. Pylons will stop the saucer's shots but smart-Alec missiles go round them, bounce off them and can get you on the rebound. Four hits to your craft and the game ends. Destroy all the saucers and you move up a level into even more wierd and wonderful scenery. BB

Novagen

Presentation:	■■■■■
Skill level:	■■■■□
Interest:	■■■□□
Value for money:	■■■□□



HUNTER
Joystick or keyboard
Price £9.95

A simple but compelling game. You are pursued by six 'robotships' around the screen: if you manage to shoot them all, on the next screen they become faster and more intelligent – until it's a frantic and intelligent minefield. Accurate firing is essential, as each miss means that you get fewer points for the next robot you hit.

What I like about this game is that you get better and better: the first screens can be got through remarkably quickly, enabling you to reach the hard screens straight away. The graphics are good, and smooth. Sound effects are nicely done. The game loads fast, and the instructions are adequate. Overall, very good. IC

Terminal Software

Presentation:	■■■■□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■□□

JUMPING JACK
Joystick or keyboard
Price £8.95

When a software house produces yet another version of an old arcade classic, I'm ready to yawn and award it a thumbs-down. *Jumping Jack*, however, is something different. By adding a sense of 3D perspective to the old favourite *Frogger* Livewire has managed to improve on the original to the same extent as Zaxxon improved on *Scramble*.

Frogger we probably all know: the player has the task of guiding a frog across a busy highway, followed by a swift-flowing river, avoiding perils such as cars and crocodiles. *Jumping Jack* has all the usual extras to be found in Frogger games – snakes, diving turtles, lady frog, otters and dragonfly. There is also a two-player option. And as well as the good graphics, the authors have added some touches of class: there are nine levels of play to choose



from, and the player may define his/her own choice of keys to play with – an option sadly lacking from many games on the market. Naturally, there is also a joystick option.

This game will be a treat for all fans of *Frogger*, and should also convert more people to being *Frogger*-fanatics. *Jumping Jack* is destined to become a best seller, and the definitive version of *Frogger* for the 64. DW

Livewire

Presentation:	■■■■■
Skill level:	■■■■■
Interest:	■■■■□
Value for money:	■■■■■



KAKTUS
Joystick or keyboard
Price £8.95

My first reaction was "what a load of rubbish": but after a while the possibilities dawned on me. The mainstay of the program is the swarm of wasps and hornets (yes, I know hornets *are* wasps) homing towards the base of the cactus, where the tastiest morsels are located.

If you have been crass enough to let them reach ground level they chomp away at the stem and topple your home: and that's one life gone abegging. Show no mercy, pepper them with gunshot – after all they are excreting some pretty nasty stuff in your direction. Damn and blast! Nearly forgot the mole: the swine insists in plugging up your doorway from one side of the screen to the other. Screen two: the buzzard, a bouncing bomb specialist, makes his entrance. Quite a lot going on now. Did I mention that you mustn't allow the wasp droppings to erode away the soil?

Competent rather than state-of-the-art graphics and sonics; but my first impressions were indeed way out. *LS*

Supersoft

Presentation:	■■■□□
Skill level:	■■■□□
Interest:	■■■■□
Value for money:	■■■□□

OLYMPIC SKIER
Joystick only
Price £6.95

Great fun when played by a bevy of equally incompetent novices as there is plenty of scope for ridiculing pathetic performances. The *aprés ski* will certainly consist of hoots of derision duly prompted by the program's assessment of bungling beginners' score-lines.

The BBC's winter sports theme preludes the three-part test. Section one is a slalom run, with the mandatory timer; part two is a ski-jump, a welcome change; and the last is an obstacle course, weaving between fir trees with logs and rocks to jump over. There is a helicopter standing by to ferry casualties to the elastoplast shop also adding a splash of welcome colour.

Considering the limited scope, the graphics are fine; the sonics are mainly varying degrees of white noise relating to your speed. *LS*

Mr Chip

Presentation:	■■■□□
Skill level:	■■■□□
Interest:	■■■□□
Value for money:	■■■■□

SPLAT!
Keyboard or joystick
Price £6.50

Whoopee! The SID chip virtually talks ... well, as near as damn it. The rest of the sonics are mundane but definitely full marks for the exclamation. The graphics are run-of-the-mill too. Nevertheless the game is an ingenious, refreshing variation of the familiar maze situation: essentially the screen is a window on a large foraging area, with succulent tussocks of grass and windfall plums waiting to be devoured: dangers lurk in the shape of spikes, unstoppable objects (ok when green or purple) and sheets of cyan water.

These are minor considerations however; the big splat maker is the patterned boundary surrounding the screen. As your window-on-the-world slips and slides around most unpredictably, and a trifle jerkily, there is always the iminent prospect of being sandwiched 'twixt maze and wall (good job the squelch is in purple!).

Never a dull moment, in fact; continued interest is ensured by the maze's aspect continuously changing and the progressively in-


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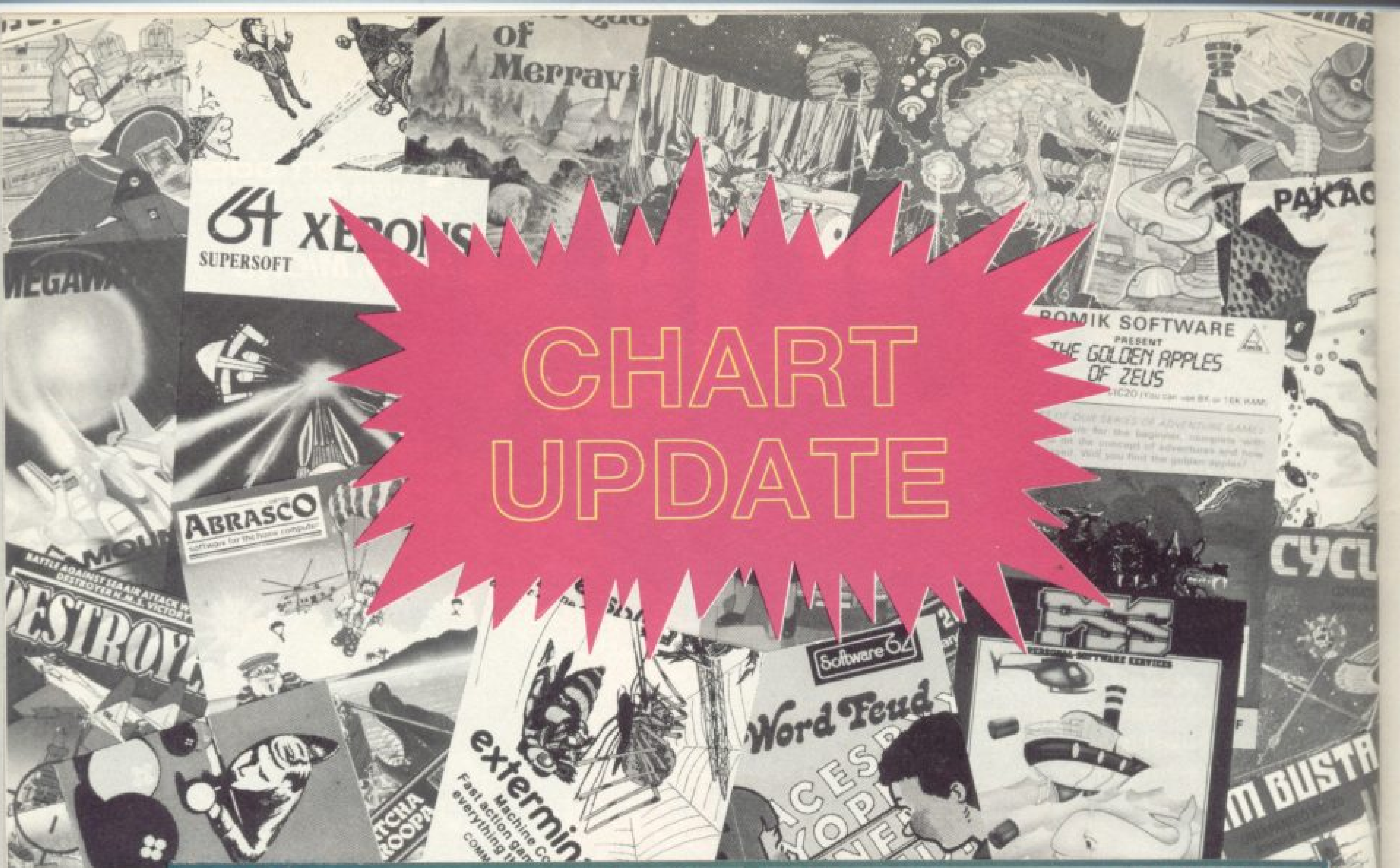


CHART UPDATE

CBM64 — AUGUST

1	(1)	Beach Head	US Gold
2	(-)	Valhalla	Legend
3	(-)	Hulk	Adv. Int.
4	(-)	Loco	Alligata
5	(-)	Arabian Nights	Interceptor
6	(2)	Space Pilot	Anirog
7	(-)	Cavelon	Ocean
8	(9)	Solo Flight	Microprose
9	(–)	Encounter	Novagen
10	(–)	Chukkie Egg	A&F
11	(15)	Sheep in Space	Llamasoft
12	(-)	Son of Blagger	Alligata
13	(10)	Flight Path 737	Anirog
14	(-)	Caverns of Khafka	Cosmi
15	(–)	House of Usher	Anirog
16	(–)	Star Trooper	Melbourne
17	(8)	Blagger	Alligata
18	(–)	Bozo's Night Out	Taskset
19	(13)	Scuba Dive	Martech/Durell
20	(4)	Forbidden Forest	Cosmi

TOP 3 MANUFACTURERS:

US GOLD
ALLIGATA
ANIROG

VIC-20 — AUGUST

1	(1)	Flight Path 737	Anirog
2	(2)	Chariot Race	Microantics
3	(6)	Computer War	Creative Sparks
4	(17)	Duck Shoot	Mastertronic
5	(5)	Snooker	Visions
6	(9)	Jet Pac	Ultimate
7	(–)	Vegas Jackpot	Mastertronic
8	(4)	Kong	Interceptor
9	(7)	Bongo	Anirog
10	(13)	Tank Commander	Creative Sparks
11	(20)	Tower of Evil	Creative Sparks
12	(3)	Flight 015	Ferranti
13	(–)	Phanton Attack	Mastertronic
14	(11)	Wiz and Princess	Melbourne
15	(-)	Sub Hunt	Mastertronic
16	(12)	Hell Gate	Llamasoft
17	(8)	Sub Commander	Creative Sparks
18	(10)	M.L.B.A.T.E.T	Llamasoft
19	(16)	Dracula	Anirog
20	(-)	Gridrunner	Llamasoft

TOP 3 MANUFACTURERS:

CREATIVE SPARKS – (THORN EMI)
MASTERTRONIC
ANIROG

An independent chart to best-selling games, compiled by R.A.M./C. for Commodore User, representing retail sales in independent specialist outlets referenced against distributive sources.

creasing difficulty levels, where only super-slick joystick jugglers will stalk with any vestige of composure.

The 40K is eased into memory courtesy of 'Power Load', a fast-load program. A definable keys option is provided for those who have worn out their joystick. *LS*

Incentive

Presentation:	■■■■□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■■■

SPACE WALK
Joystick or keyboard
Price £1.99

Although the scenario is none too original, the skill factor in this game is pretty high. You're a jet-packed astronaut floating around in space, trying to retrieve stray satellites and get them to the safety of your spaceship before they sink down and crash on the moon.

That's the easy part; as the levels of difficulty increase, alien astronauts appear to fire at you. Of course, you can fire back, but you've also got to avoid the asteroids zooming around. Graphics are pretty reasonable but there's little in the way of sound. Manoeuverability is good, though. Especially in the way gravitational pull between astronaut and satellite is approximated. At the price, this game has got to be good value. BB

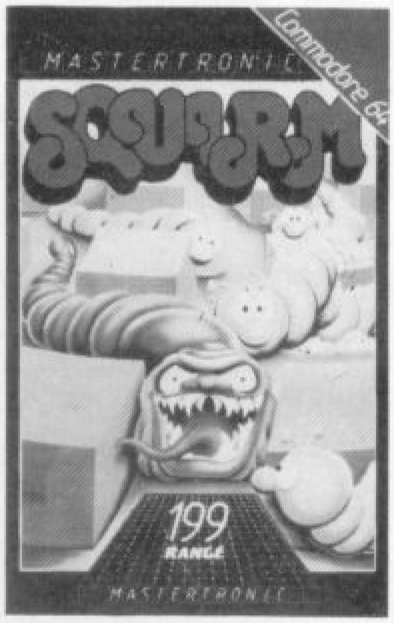
Mastertronic

Presentation:	■■■□□
Skill level:	■■■■□
Interest:	■■■■□
Value for money:	■■■■□

SQUIRM
Joystick or keyboard
Price £1.99

This game is a first cousin to *Pacman*: and it failed to hold my attention beyond the second level, though not because it was too easy.

From the off you need to chase a queen caterpillar, gobbling up her new-laid eggs until you are gorged with 255 of them. Her guards, meanwhile, patrol the maze trying to reduce your tally of lives. When the magic total is attained, the tables are turned briefly allowing



you to enjoy a few Squirmburgers. All too soon bonus time is over and a different maze is generated.

Sounds fair enough: so why the loss of interest? My reply is simply "Itsy-bitsy graphics". Perhaps a change in background colour away from black would help: but at such a bargain-basement price my reservations won't afflict everyone. *LS*

Mastertronic

Presentation:	■■□□□
Skill level:	■■■□□
Interest:	■■□□□
Value for money:	■■■■■

PROTECTOR
Joystick only
Price £5.99

A gladiatorial contest between a ram-jet, which we are all rooting for, and spinning saucers in various hues. Shades of *Cyclons* in that it is good policy to lure them into a collision; this can be more convenient than blasting. The alien pilots display intelligence, so it's up to you to summon up more. Apart from ramming they also let fly with bombs.

No complications, no frills: just a straightforward battle with nine skill levels ... which is ok as part of the collection, but not so hot if you only own three or four tapes. Middle-of-the-road graphics and sonics, too. But the action at least is continuous and furious. *LS*

Rabbit

Presentation:	■■■□□
Skill level:	■■■□□
Interest:	■■□□□
Value for money:	■■■□□

"When I got it home, it was nothing like the picture on the box."



"It couldn't have been Activision."

How often have you taken a new piece of software home to find it just didn't live up to the blurb on its box.

Wild, zany pictures, promises, promises... And the game play itself is one big let-down.

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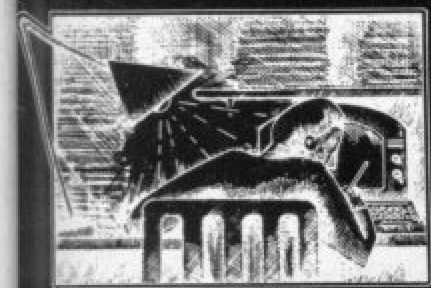
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TOMMY'S TIPS

Tommy is Commodore User's resident know-all. Each month he burrows through a mountain of readers' mail and emerges with a handful of choice queries. The result, before you, is a wadge of priceless information and indispensable advice. There's even the odd useful tip as well.



Dear *Tommy*, Please can you tell me how I can print large and small letters on the screen at the same time? I ask this because recently you printed a program called *Hieroglyphic* and I could not print it into my computer.

Can you also tell me if the Vic-20 programs fit the Commodore 64?

I think you have got a little confused because the program was not listed on a Commodore printer; if it had been, the upper case C would have been printed as a horizontal line and the lower case c would have been an upper case C (if that's not too confusing). When typing in the *Hieroglyphic* program type SHIFT C for line 5 and a normal C for line 6; likewise for the S in lines 7 and 8. As for getting both upper and lower case letters on the screen at the same time, just press the CBM logo key and the Shift key together. (The reason I know that the program was not listed on a CBM printer is that when using upper and lower case letters the program must be typed in lower case – typing in upper case using shift would have caused a SYNTAX ERROR when the program was run).

On your second query the answer is – a definite maybe! So long as there are no PEEKs, POKEs or machine code calls, Vic-20 programs should run on the 64 without any problem; the screen width may have to be adjusted though. The problem if you already have them on tape is that you cannot load Vic-20 tapes into the 64; you have to retype them in full (disk-based programs *will* transfer, however). If the program contains specific memory accesses then it might still be possible to convert them if you know what the program is doing; it just involves a bit more work before you can type it in and run it.

Dear *Tommy*, I have a 64 on which I have written a number of statistical programs. While running this type of program it is impossible to avoid the possibility of having an overflow error during computation. Is it possible to recover from this type of error and stay in the Basic program?

I'm afraid the simple answer to this is "no", at least not without going into machine code each time you do a calculation. There are however some extensions to Basic that allow an 'ON ERROR GOTO' command; this will allow you to trap such an error, the routine you jump to giving a warning and possibly reducing the scale of the number. **David's Basic**, on offer in the *Deals for Readers* section, features such a command.

Are you really sure that you need numbers that big though? Sometimes changing the order in which calculations are done can avoid such errors. The only other way is to test the computation in stages *before* carying out each calculation. If the results of the previous stages are likely to cause an error when added or multiplied together then you could indicate an error yourself at that stage and avoid doing the next calculation.

Dear *Tommy*, Could you please explain the following odd effects I have discovered on my unexpanded Vic-20? In Direct Mode, POKE 4098 with any value from 0-255; then hit return and type LIST, Return. A *corrupted* LIST will appear even though the machine may only just have been switched on.

I have had a few problems entering a mix of Basic and machine code with the programs crashing as a result of the corrupted list.

My local Commodore shop (South Coast Computers) assures me it is an operating system fault built into the machine as their demo Vic and a new machine show the same effect.

The thing I fail to understand is why on earth you should want to POKE 4098 with any value at all? This address is right at the start of the Basic program area, so what you are doing when you change the value is to corrupt (or set) the line link pointers which are at the start of every line; in other words you have set up a false pointer to the next line in Basic. The result, unless you happen to POKE exactly the right value, is a corrupt list – because from then on all the other 'pointers' will be wrong, since the address pointed to will no longer be the start of the next line but part of the program.

If you are using a Basic/machine code mix, be very careful where you store your machine code. It is extremely important that you reserve a space in memory by changing the 'top (or bottom) of memory' pointers so that the two parts of the program do not overwrite each other.

Dear *Tommy*, I have a query relating to the usability of a 64 program on a Vic-20. I recently purchased a 64K RAM pack which I presumed would allow me to use programs for a 64 on my Vic. I was greatly disappointed to find that hardly any of the programs worked. Can you tell me why? and how can I get such programs to work?

Unfortunately, buying a 64 RAM pack does *not* give you the facilities or even the same memory as a CBM 64. Most 64K RAM packs are split into eight 8K blocks, only some of which can be accessed at any one time. You can normally select which blocks you wish to access directly, but the rest of the RAM is 'hidden' from the memory map (although the contents of all 64K is maintained while the power is on). Unfortunately the memory map of the Vic cannot be altered to give more than an extra 24K available to Basic. As if that were not enough, the sound facilities are totally different, the sprites do not exist on the Vic and any PEEKs or POKEs will need to be changed as well. The result is that no matter how hard you try you will never manage to make a Vic act exactly like a 64. Having said that, there is no reason why a program written for the 64 in standard Commodore Basic will not run on the Vic, but only if it doesn't use any of the facilities that make the 64 a better machine. If anyone tells you that adding a 64K cartridge to the Vic will turn it into a CBM 64 then I suggest you go and find some of that salt you have left over from the winter!

Dear *Tommy*, I have a Vic with 3K + 8K + 16K and I want to use the 3K block for redefined characters. In Butterfield's series *Visiting the Vic video chip* he said somewhere: "The VIC-chip can only see the lowest 8K of RAM (block 8 to 15)". In an advertisement for a 27K expansion you can read: "With 8K or more activated the 3K block can be used to hold redefined characters ..."

The 3K block is ideal for this; but my problem is *how do I make the VIC chip see block 9 to 11?*

I tried to copy 3K of the character set down from ROM, and when PEEKing I found them all there. But when I told the Vic where to find the characters by POKEing 36869,201 (block 9) I got only garbage on the screen. *Can you help?*

I'm afraid the advertisements are somewhat misleading; you cannot store the character set in any expansion memory area, only in the permanent RAM that comes with the Vic (4096-7696). It is this area that is referred to as blocks 8-15; blocks 9-11 are therefore memory addresses 4608-5632 and have nothing to do with the 'lower 3K RAM area' which occupies memory between 1024 and 4095.

When you have 8K or more expansion RAM fitted, what you have to do is raise the start of Basic to 6144, and put your redefined character set in the 1024 bytes between 5120 and 6143. To alter the character set location you will need to type **POKE 36869,PEEK(36869) OR 12;** this ensures you do not change the screen location which is determined by the same register.

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d=disk t=tape c=cartridge

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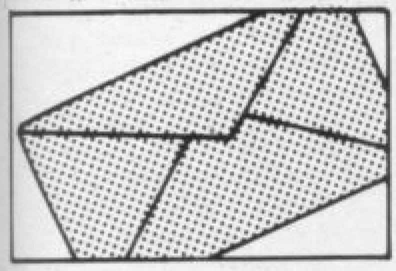
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Write away

This is your page: normally we write for you, but here we listen. Feel free to let us know what you think – about the magazine, about Commodore, about suppliers, about life, art, the meaning of existence or whatever. We don't print everything we receive, of course; but anything that might be of specific relevance or general interest will make it to these pages.



New York, New York

For three months now, copies of your magazine have been available on Newsstands here in New York.

One reason I spend more time with Commodore User than I do with American mags is the superiority in your Publication's content. American magazines seem to concentrate mostly on type-in games. These are a waste of time – they take forever to type in and they're dull and suffer from the snail's speed of Basic. Your magazine seems much more devoted to programming tips, useful utilities, and thorough product news and reviews. American magazines are much thicker than yours, and a little more polished, but style is no substitute for content. One tip you might take from them concerns program listings. All American Commodore magazines have some sort of symbolic system to substitute for the graphics characters that are generated by cursor and color controls to make them more legible. Also, some magazines have special ASCII checksum proofreaders that work line by line to help in debugging. It's also interesting to note that Jim Butterfield is looked upon as Commodore Guru in your country as well.

As far as the product market between our two countries, there's a big difference. Hardware is simply cheaper here. The 64, 41, 801, 1526, and 1702 all sell for about $200 give or take $20 at good discount stores in the city (This is probably the cheapest price in the world for all sorts of electronics). The SX-64 can be had for about $680 if you know where to look. Commodore has gone the mass-merchandising route here, and as such has caused a sort of mutiny by its authorized dealers, something CBM's new chairman has on the top of his list to ammend. Commodore seems to have a much better set up in the U.K. than here. Most of the bungling that they perform so well can be blamed on their U.S. set up. This show that they're having in London would never be done here (In Canada yes, but not here).

Commodore's software is also cheaper here. I bought Easy Script for $34, Simons' BASIC for $29, and their assembler for $17. It's funny, in terms of software, Commodore does not offer all their American product to you, nor their British product to us. As far as other software goes, I've noticed this: 1) You have almost no American software, 2) We have little British stuff, 3) Ours looks much better, and 4) You are Cassette worshippers. About 2% of our software is on cassette, 10%-20% on cartridge, and the rest is on disk. The datasette is a cruel and unusual form of torture, and here the disk drives are fairly cheap, so they're popular.

I've read that 90% of all 64 owners have a drive. Do you know that there was a period of 2-3 months when you couldn't buy a 1541 in this entire country? Commodore ran out; they never excpected such a high demand. By the way, nothing is sold in a package with software here, most people don't consider it a bargain, because, to be honest, a lot of piracy goes on. One thing about cassette games, they're cheaper. Most disk games are about $35.

Keep up the good work.

Andrew J.Brust, 308 West 4th Street, New York, NY 10014, USA.

View from New Zealand

The Vic and 64 are well known now in New Zealand, but the problem for the Vic owner is that it is treated by the dealers as not much more than a games machine; surprising since the cost is around $400 (NZ) compared with about $1000 (NZ) for the 64. To expand the Vic by 16K is around $160 (NZ), so it is easy to understand why not many people bother when the software available for serious use is just not available.

It would be nice to know that someone out there is thinking of us and trying to develop software which would fully utilize the capabilities of Vic in such fields as Education and perhaps I see at Commodore UK a glimmer of hope in Gail Wellington's outfit (Reviewed in the February edition).

What can your magazine do? Perhaps you could find out what people are using the Vic for in the areas of education, interfacing with measuring instruments, modular programming, anything out of the ordinary in fact. Perhaps also you could find out what ideas people have for uses of Vic and put some pressure on the software producers – they are not going to produce anything unless they know it is in demand.

Geof Fisher, 15 Loyndham Road, Pinehaven, Upper Hull, New Zealand.

Praiseworthy

Through your columns I would like to praise A&C Software 51, Ashtree Road, West Midlands.

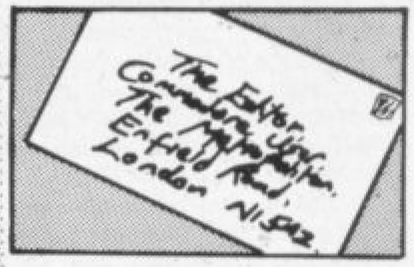
I purchased for my Vic 20, a Data program and a Vicset word processor. Later I bought a 1520 printer plotter thinking that I could use the programs with the printer, which it wouldn't. I wrote to A&C asking them to alter my programs, if possible to print on the 1520. Within two days they sent me 2 new programs to run on the 1520 and kindly asked me to return the original tapes to them. What trust, what service and no charge!

I would like publicly to thank them in your magazine.

Mr V. Lawton, 29 Ivy Green Drive, Springhead, Nr. Oldham, Lancs OL4 4PR.

Return to Beaver

Through your 'Deals For Readers' section I purchased an 'Infotape' Data Base Program to assist me with amateur radio operators' call signs and locations throughout the world using my CBM 64.



Upon receiving the tape, I spent a whole day trying to make it run. Alas! No such luck! I returned the tape to 'Beaver Software' and the evening after posting received a telephone call from 'Beaver' at home. The simple fact of the matter was that I had not read the instructions correctly and when the format was explained to me I felt very silly.

The gentleman from Beaver on the other end of the telephone could not have been more helpful.

The object of this letter is to illustrate that magnificent after sales service still exists, and this is reflected in the superb attitude of 'Beaver Systems'.

Top marks to Beaver for a splendid PR exercise. No Prizes for guessing who has secured a customer for life.

Bernard Deans, 4 Deanbank Street, Dundee, DD2 2EA.

Cold start

I would like to tell you about the first club in Iceland for Commodore owners specially Vic-20 and C-64. The club started last October and now is about 130 members in the club. We have published 4 newsletters and are working on the 5th. We would be very glad if you could put our name and address in your paper so other Commodore owners will know of us here in Iceland.

SYNTAX Newsletter. c/o Guðmundur Gislason, Bleiksárhlíð 4, 735 Eskifjörður, ICELAND.

Camel POKE

To prolong 'Attack of the Mutant Camels', add line 0 POKE 11639, 255 after loading the first (loader) program, then RUN.

Hope this is of interest. (Audiogenic's 'Motor Mania' can be altered with POKE 8646, 255 after loading; I think this is a less popular program though).

Roeto West, 4 Highview, Holford Road, Hampstead, London NW3 1AY.

Help for handicapped

We are in the process of establishing a database of software for the handicapped – BARDSOFT. Briefly, each entry to the database will contain a description of the programs, the handicaps they are suitable for, the type of computer system required, name and address of supplier/developer and price, etc. This information will be made available through printouts in answer to specific enquiries.

The aim of BARDSOFT will be to facilitate the exchange of information on software relevant to any aspect of the lives of handicapped people. One major addition will be the concerted effort to promote the database, and therefore the software, abroad. This is what we have been doing successfully for non-software products in the field.

As we are currently collecting and processing information, we would be pleased to hear from any of your readership who may wish to contribute to BARDSOFT. For further information please contact me at the address below.

Peter Curran, Handicapped Persons Research Unit, Newcastle upon Tyne Polytechnic, No.1 Coach Lane, Coach Lane Campus, Newcastle upon Tyne NE7 7TW.

Commodore resolve

I would like to thank you for publishing my letter in the April 1984 issue of Commodore User, as a result of this Commodore have been in contact with me and resolved my complaint.

The response which I had from your readers was overwhelming, how pleasant it was to receive so many helpful and friendly letters, I have not replied to all the letters yet but I will do so.

If you have tucked away in some corner a listing for a 'DIR' sorter for the 1541 disk drive please consider publishing same as I am sure many of your readers would find it useful, as I would.

Many thanks for a friendly and informative magazine.

Derek Rawnsley, 9 Saltergate Road, Messingham, Scunthorpe, South Humberside DN17 3SZ.

Can someone help?

I was in London fifteen days ago and, at the Pilot Software City, I bought – for 28,70 LGS – the Commodore VICFILE.

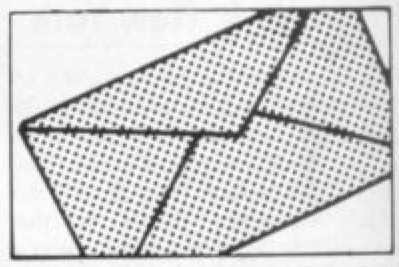
Back in Milan, I tested the program, which loads with some strange noise in the drive, and everything seemed to run very well and, I must say, that was exactly what I had in mind to buy.

Unluckily, what I cannot get to run, is the most powerful part of the program, the Specify Search and Search File (what of course I discovered after many hours of inserting items...).

Let me explain: after creating my format, inserting data (about 100 records with 20 fields each), I used the Specify Search program, selecting two of the fields and everything, again, seemed to run normally; but when I went to the Search File Option, I just got an Error 36, what means that no search file was created.

It's clear that I tried and I checked everything many times before writing you. By using the Directory through Disk Utilities, I was able to see that my Search File was present in the Directory.

Moreover I tried to copy the Search File to another diskette and, once, it worked. The attempt to re-copy to the first diskette (after




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Although simple to learn, MusiCalc was designed to meet the needs of professional musicians. In fact, it delivers the quality and capabilities professionals have spent thousands of dollars for—up until now. Once you have the Commodore 64 computer and disk drive, you can get started for under $100 with the MusiCalc 1 Synthesizer & Sequencer.

This is a standalone software program you'll never outgrow. And with the variety of other MusiCalc products currently available, plus the many more items Waveform will be introducing in the months ahead, you can expand your music system along with your interest and ability.

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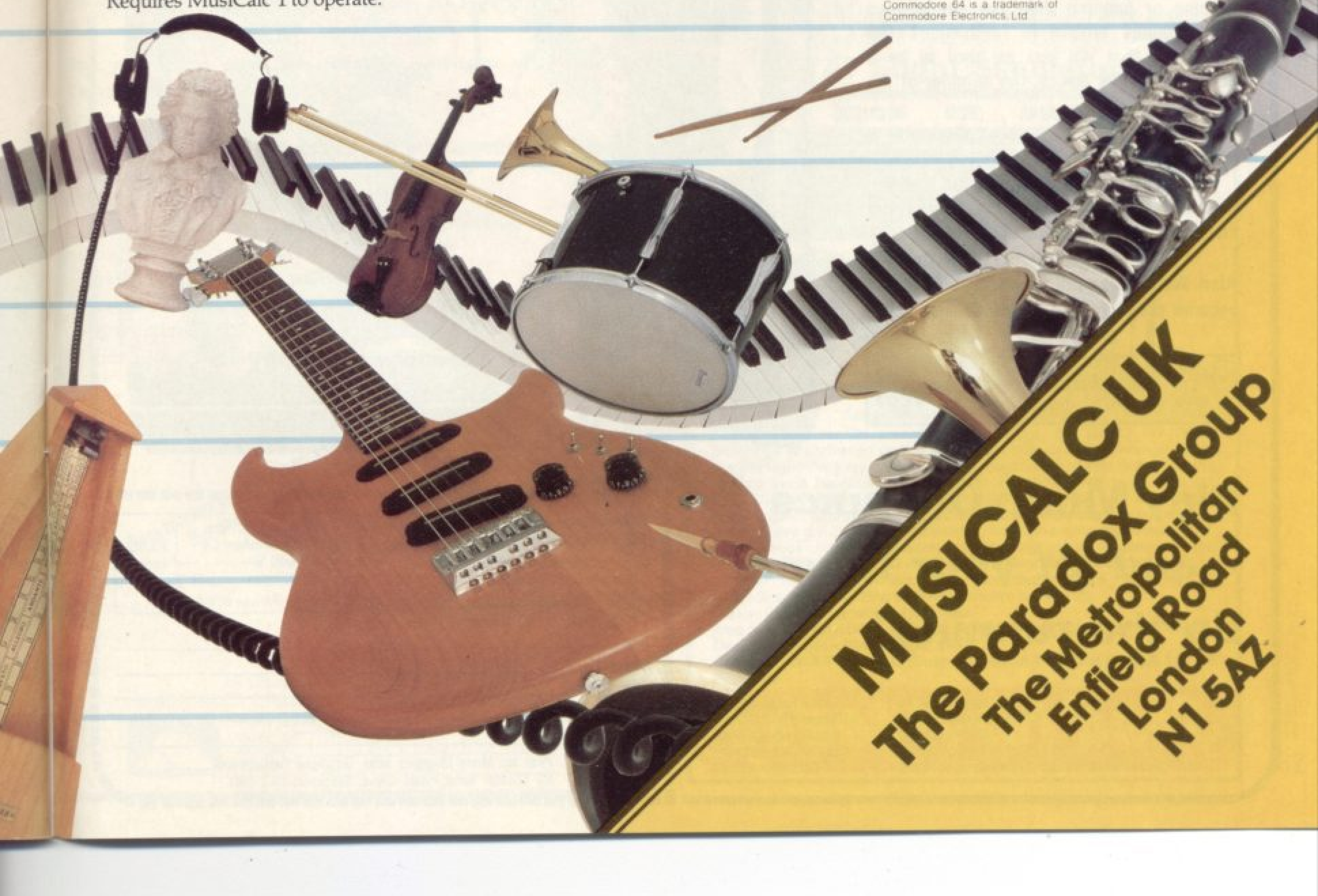
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Fancy pitting yourself against the world's best at this summer's Olympics?

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Post to: Micro Olympics offer, Database Publications, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

scratching the original File) didn't work and any other attempt to do again what had worked the first time, was a failure.

It's also clear that I repeated my test with new diskettes and new Format and Records, just to continue to see this Error 36, which cuts at least 90% of my interest in the rest of the program. Can you help me someway? Or can maybe some other VICFILE owner help? Apart of that, best compliments for your mag.

Luciano Casanova, 20021 Bollate (Milano), Via Como, 31-58, Italy.

Complaints dept.

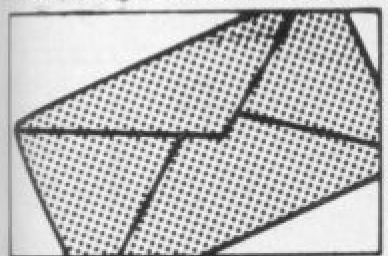
I bought a copy of your June issue on the strength of two articles. Both promised to be most informative.

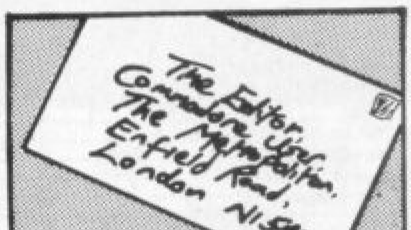
The articles concerned were "Butterfield on Video" and "All about Wedges". The first was excellent, well written and with a sound teaching method. The second came as a bit of a strain. Either it is amazingly badly written or a major part is missing. It would appear that the article has intentionally or unintentionally been trimmed to make way for the next page: adverts. This seems a bit strong in a magazine where adverts exceed all else by seven pages and where reviews of manufacturers' products account for about 40% of the remainder. Hardly editorial endeavour at its best.

Your magazine has all the makings of a superb publication, and it is a great disappointment to think that the ragged amateurish approach which characterises so many other bashed-up efforts, called magazines, is creeping into your domain.

I register my protest.

M.J. Rutter, 36 Westpoint, Newick, Lewes, Sussex BN8 4NU.





Canvey Island Club

Thanks to your free advert offer I have managed to form a CBM users club to be known as "Castlepoint Commodore Computer Club 4C", and would be pleased if you would include this information in your files. The address and telephone number is as below.

Perhaps you would be good enough to redirect any enquiries to us.

Many thanks for a super mag but please no more green and white – see page 42, June 1984.

I. Elliott, 116 Church Parade, Canvey Island, Essex.

Clubbable

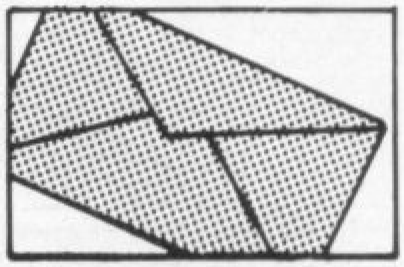
Please note that the Gravesend Computer Club has now moved to The Council Tenants Club, Whitehill Lane, Gravesend, Kent.

The club meets every Thursday evening from 7.00 to 10.00.

Our members have a wide variety of computers ranging from the Spectrum, BBC to the Vic-20 and the Commodore 64.

For further details contact the club secretary at the above address.

Steve Janday, 58 Apsledene, Hever Farm Estate, Singlewell, Gravesend Kent DA12 5EE.



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747-Pilot for Vic-20 with Super Expander or NEW 8K+ expansion memory version – state which. High resolution display of aircraft attitude and angle of bank, numerical readout of speed, Mach number, engine thrust, fuel, flaps, height, vertical speed, course, miles covered and elapsed time. Take off, climb, cruise, descend and land! Hi-res graphics, colour, sound and function keys. Cassette £6.99 from VICTAY, 12 Leahill Close, Malvern, WR14 2UE, England.

Yanks are hackers too! Washington area C-64 user wants to swap disks and info. Write to David Bell, 5528 Plainfield Ave, Baltimore, Maryland 21206, USA.

Listings for 64 send tape and £1.60 to Chaparrel, 12 Hollybank Gdns, Hastings (evenings 436522 about disks and printers).

CBM64 computer, C2N cassette unit, disk drive, 1520 printer-plotter and 1525 graphics printer for sale. All leads, manuals etc. included. Less than two months old, in original boxes. Offers please: Andrew D Jones, 1 Hollybank Road, Dundee DD1 2PL.

CBM64 computer C2N cassette unit, 1541 disk drive, 1520 printer plotter and 1525 graphic printer for sale. All leads manuals etc included, less than two months old in original boxes. Offers please. Box 014.

32K Vic, cassette, 1541 disk, printer/plotter, over 100 tapes, 60 disks, cartridges including Monitor, Super Expander, Jelly Monsters, and Speech Synthesiser, software worth £500. £800 ono, North London area. Box 012.

Vic-20 plus 16K switchable expansion plus six games plus Intro to Basic 1 plus other software. All in excellent condition. Total price £140. D. Chambers, 11 Thetford Road, Mildenhall, Suffolk IP28 7HX. Phone 0638 714051.

Poker for the Vic-20 owner with 16K RAM. Price £7.95 p&p. Free from Poker Software, PO Box 1, Chatteris Cambs PE16 4JR.

Vic-20 Users. Easysave will let you save machine code programs with a name so that you can load them back as easily as Basic programs. Price is £4.95. Reconfiguration will rearrange your Vic-20 to any memory configuration without removing your extra expansion. Price is £4.95. The Vic-20 Resest Button will enable you to recover from a crash caused by system lock-up in machine code programming without switching off. Invaluable to M/C programmers. Price is £3.95. These items and others available from: Minversound Ltd, 8 Frederick Street, Luton, Beds LU2 7QS. Tel: (0582) 413583.

Vic-20 Software Hire No membership fee! Quality titles (eg Skyhawk, Jetpac, Flight 015) from 50p per week. Already 500 delighted members. Join them now. All games originals. Send 2 x 16p stamps for your Hirekit to: VSH(CU), 242 Ransom Road, Mapperley, Nottingham.

Graphix 64 over twenty commands enables you to plot/erase points, draw lines and fill/erase areas on screen. (As advertised in Vicsoft magazine). Used only twice. Bargain at £8.50. Tim Bak, 117 Kingsway, Braunstone, Leicester LE3 2PL.

I desire to exchange quality CBM64 software. Send your list to: Alberto Borgini, Via San Rocco 34, 21013 Gallarate (Varese), Italy.

Games galore for the Commodore 64. Ice Cream: run a fleet of ice cream vans for a week and make as much profit as possible, £6.50. Yahtzee: a computer version of that classic game, £6.50. For full catalogue send a sae or cheque/PO to: Michael Smyth, Edenberry Lodge, Banbridge, Co Down, Ireland BT32 3BS.

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Personal Software Users' Association. Library and swap-shop service. For details send large sae to Commodore Section, P.S.U.A., 19 Lammerton Terrace, Dundee DD4 7BR.

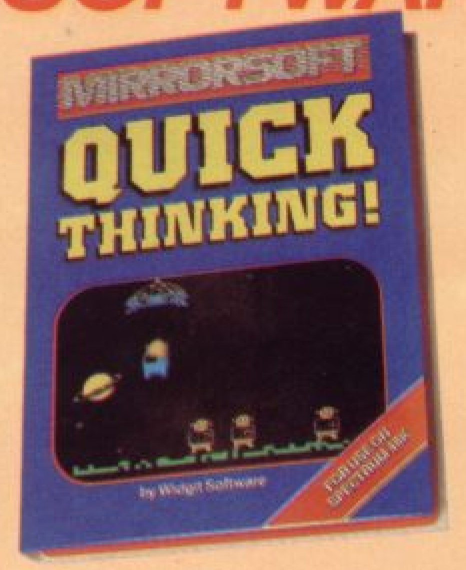
Like to start writing in machine language? Syspack64 will let you do just that. Syspack64 is a complete package for the CBM64 and includes a superior two pass assembler (fully compiled) using labels, variables, hex/dec/octal, etc. Disassemble any part of memory, hex and ASCII memory dumps, modify memory and much more. The package also includes two superb mc monitors (relocatable) and demo files for use with the assembler. Supports any printer. Full documentation supplied. Disk 9.75/Tape 8.25 (please specify). Same day despatch. Syspack64, Dept CU, 7 Patrick St, Strabane, Co Tyrone BT82 8DQ (sae for details).

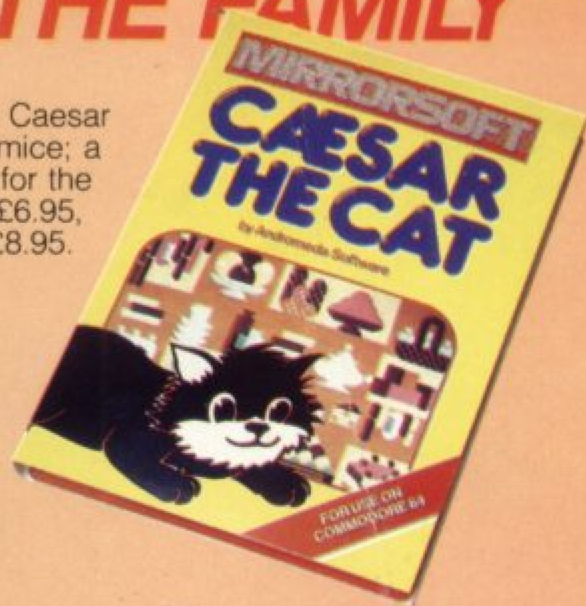
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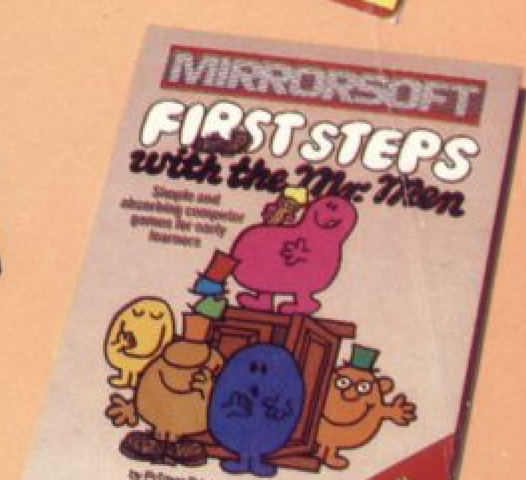




Caesar the Cat Help Caesar clear the larder of mice; a challenging game for the BBC B and Spectrum 48K, £6.95, and the Commodore 64, £8.95.



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Vic-20 with cassette recorder 4-slot motherboard, Voodoo, Super Castle, Super Expander, Speech Synthesiser, Programmer's Aid, two tape games, books, Vic dustcover, C2N dustcover. Worth £320, going for £150 ono. Paul Cooke, The Chine, Runfold, Farnham, Surrey GU10 1PH. Phone Runfold (02518) 2905.

Games galore for the Commodore 64. Ice Cream: run a fleet of ice cream vans for a week and make as much profit as possible, £6.50. Yahtzee: a computer version of that classic game £6.50. For full catalogue send a sae or cheques/PO to: Michael Smyth, Edenberry Lodge, Banbridge, Co Down, N Ireland BT32 3BS.

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CBM64 software to swap. Have many titles including some American games. Send sae to: Ikky, 20 Equitable Street, Rochdale, Lancashire OL11 1JQ. All letters will be replied. Want more American titles.

I wish to exchange CBM64 programs (commercial) and ideas. Eg I have Hobbit (boxed) to exchange for Valhalla. All letters answered. T Beale, Moorlands Cottage, Drumlithie, Kincardineshire, Scotland.

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Easy Script never used, good as new £50, you collect or depatched for £55. Phone Burton (0283) 64511 after 5.00pm.

Vic-20 cartridges, switchable 16K; Super Expander, Sargon, Mission Impossible, Adventure Land, Count, Cosmic Cruncher. Cassettes; Victape 3,4,5, Home Accounts, Rip-off, Gerrard Adventure, Hareraisers, Matrix, Dungeons, Soccer, Jetpac, Flight Path 747. £125 or offers. 0502 715989.

64 edit file utility program. A must for anyone using or wishing to use sequential files. Program creates, adds, subtracts, amends, sorts, prints and saves/recalls to disk or tape. Send £3 with disk or tape. J. Aitken, 43 Braedale Ave, Motherwell. Return by next post.

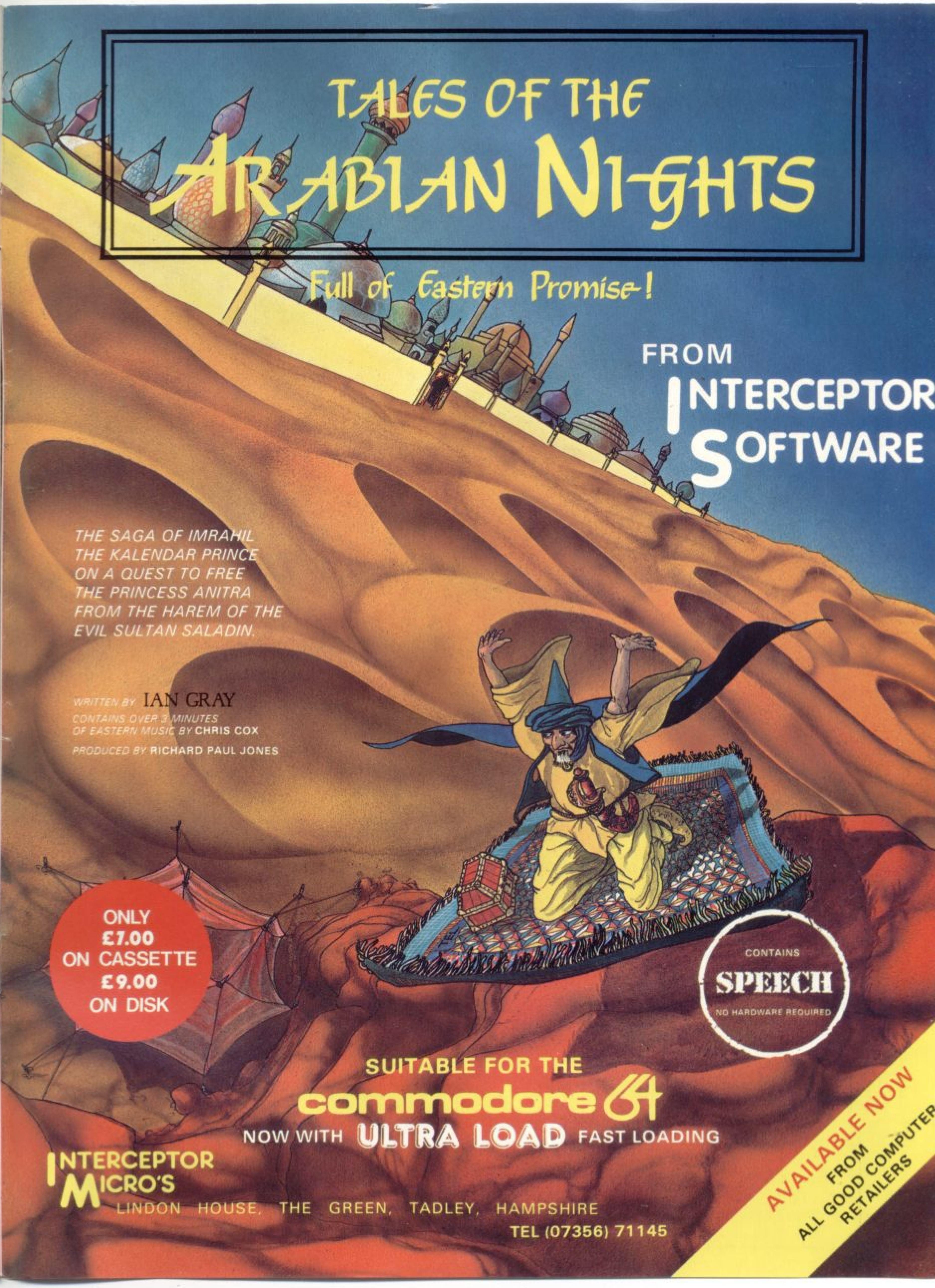
Easy Script word processor for CBM64. Unwanted extra. With disk drive, accept £35 ono. K Wadcock, 95 Runshaw Avenue, Appley Bridge, nr Wigan. 02575 2001.

CBM64 Condat Database program. Full facilities include Sort, Search, Ammend, Display, and Password entry. New machine forces sale. First £2.00 plus sae secures. To: S.A. Verner, 96 Deleval Close, Newton Aycliffe, County Durham DL5 4QP.

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